Empirical Research on Financial Notes to the Accounts and

Earnings Management

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Abstract

Managers can influence the amount of net income their firm reports by variation in the application of accounting policies or by making real cash flow decisions. 'Earnings management' is the term given when such choices or decisions distort the fair presentation of earnings. Such earnings management activities can lead to negative consequences in the long-term. Accounting scandals in the past have shown that earnings management can even threaten the existence of a firm. Therefore, it is of crucial importance to detect and restrict earnings management. The notes to the accounts can provide information, which is otherwise not presented on the face of the financial statements. Especially the accounting policy disclosures improve the understanding about a firm's current and future earnings.

According to the comparability theory, there should be comparable accountings of firms in the same industry that are subject to similar economic events. Extending this theory, managers of comparable firms should translate the same economic events into similar notes to the accounts and contain similar earnings and discretionary accruals. Therefore, this PhD thesis examines whether similar notes to the accounts are negatively associated with a firm's propensity to manage earnings. This means that the effect of similar textual accounting policy disclosures or rather notes relative to other firms in the same industry is tested on both, accrual-based and real earnings management proxies.

This research uses detail-tagged XBRL notes from SEC EDGAR system as data source. To operationalize the within-industry similarity of the XBRL-formatted notes, the cosine similarity measure was utilized in this study. Two different similarity scores of the notes are adopted. First, the full set of accounting policy disclosures and second, the revenue recognition disclosures. The key findings demonstrate that firms with more similar notes of the previous year conduct less accrual-based earnings management activities in the following fiscal year. Also, the empirical analyses show that more similar accounting policy and revenue recognition disclosures are negatively associated with real earnings management activities. Collectively, these results indicate that firms with an overall better accounting information environment as measured by more similar notes, relative to industry peers, engage in less accrual-based and real earnings management activities in the following year.

A limitation of this study is related to the aggregated proxy of measuring similarities of the notes to the accounts since the cosine similarity measure automatically increases with the document length. Also, it does not account for semantics and word frequency in documents. To control for these effects, this PhD thesis uses a Taylor expansion for note length and adopts the weighting function TF-IDF.

The results of this research are not only important for users of financial statements, but also for accounting standard setters and regulators. Moreover, the findings of this study demonstrate the utility of detail-tagged XBRL data in the financial reporting. As more detail-tagged XBRL filings are getting available, future studies could explore different parts of the notes both cross-sectionally and in the time-series. For instance, future research may construct further input-based accounting comparability measures by analyzing the properties and benefits of textual similarities within the tax notes.

Declaration of original content

I declare that, except where noted and credited, the content of this thesis is my own work. I further declare that this PhD thesis was created in accordance with the regulations and guidelines of the University of Gloucestershire. No part of the thesis has been submitted as part of any other academic award. The thesis has not been presented to any other education institution in the United Kingdom or overseas.

Any views and opinions expressed in this PhD thesis are those of the researcher himself and in no way represent those of the University of Gloucestershire.

Signed: …………………………………   Date: …25/09/2018…………………

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Table of Contents

Index of Tables

Index of Figures

Key Terms

- Notes to the accounts;

- Financial notes to the accounts;

- Earnings management;

- Accrual-based earnings management activities;

- Accounting policy;

- Real earnings management activities;

- Real cash flow decisions;

- Principal-Agent Conflict;

- Agency-costs;

- External auditor;

- Monitoring;

- Similarity of the notes to the accounts;

- Financial reporting.

Abstract

Abbreviations

AFD	=	Allowance for Depreciation
AICPA	=	American Institute of Certified Public Accountants
ALS	=	Action Learning Set
A/R	=	Accounts Receivable
ASB	=	Auditing Standards Board
BCG	=	Boston Consulting Group
CCM	=	Completed contract method
CFO	=	Chief Financial Officer
C.F.R.	=	Code of Federal Regulations
Cl. Ct.	=	United States Court of Claims
Comr.	=	Commissioner of Internal Revenue
Cong.	=	United States Congress
COSO	=	Committee of Sponsoring Organizations of the Treadway Commission
CPA	=	Certified Public Accountant
C+MV	=	Cost Plus Market Value
EBR	=	Enhanced Business Reporting
EC	=	Experience Curve
e.g.	=	for example
et seq.	=	And the following
EU	=	European Union
FAF	=	Financial Accounting Foundation
FASB	=	Financial Accounting Standards Board
FASAB	=	Federal Accounting Standards Advisory Board

FIFO	=	First in - first out
FMV	=	Fair Market Value
GAAP	=	Generally Accepted Accounting Principles
GAAS	=	Generally Accepted Auditing Standards
GCC	=	German Commercial Code
GL	=	General Ledger
IAS	=	International Accounting Standard
IASB	=	International Accounting Standards Board
IFAC	=	International Federation of Accountants
IFRS	=	International Financial Reporting Standards
IIASB	=	International Internal Audit Standards Board
IRB	=	Internal Revenue Bulletin
IRC	=	Internal Revenue Code (Title 26 United States Code)
IRS	=	Internal Revenue Service
ISAs	=	International Standards on Auditing
JMU	=	Joint Monitoring Unit
LIFO	=	Last in - first out
LLC	=	Limited Liability Company
LLLP	=	Limited Liability Limited Partnership
LP	=	Limited Partnership
MD&A	=	Management Discussion and Analysis
NAO	=	National Audit Office
NASBA	=	National Association of State Boards of Accountancy
NASDAQ	=	National Association of Securities Dealers Automated Quotations
NBER	=	National Bureau of Economic Research

NOL	=	Net operating losses
NYSE	=	New York Stock Exchange
OLS	=	Ordinary least square
OTC	=	Over-the-counter
C. Rep.	=	United States Supreme Court Reports
R&D	=	Research and Development
RMD	=	Required Minimum Distribution
ROA	=	Return on Assets
ROI	=	Return on Investment
Para	=	paragraph
PCAOB	=	Public Company Accounting Oversight Board
POC	=	Percentage-of-completion method
SAS	=	Statements on Auditing Standards
S. Ct.	=	Supreme Court (United States)
SG&A	=	Selling, General and Administrative
SEC	=	Securities and Exchange Commission
Sec.	=	section
SOX	=	Sarbanes Oxley Act
United States	=	United States of America
URDC	=	University Research Degree Committee
U.S.	=	United States of America
USC	=	United States Code
WPO	=	Wirtschaftsprueferordnung, Professional Code for Certified Public Auditors in Germany
XBRL	=	Extensible Business Reporting Language
YTD	=	Year to Date

1 Introduction

1.1 Overview

The objective of this PhD thesis is to examine whether, for firms in a given industry, similar financial notes to the accounts reduce their propensity to manage earnings. In general, the term earnings management describes the influence of managers on the earnings of a firm (Lev, 1989). There is a distinction between three categories in the literature (Srivastava, 2014). These are accrual-based earnings management, real earnings management and classification shifting. Since the last mentioned does not influence the net income of a firm, it is hard to prove this phenomenon within an empirical research. Therefore, it is excluded from the scope of this PhD thesis.

The previous research in the field of disclosure quality states that the notes to the accounts provide qualitative information which is otherwise not presented on the face of the financial statements (FASB, 2012). It enables the users of financial statements to understand and compare the reported figures (Tucker, 2015). Especially the information about accounting policy choices improves the understanding of a firm's current and future earnings (Lobo and Zhou, 2001; McMullin, 2014). For a detailed analysis regarding the impacts of the notes on the financial reporting see section 2.3.

According to the comparability theory, firms in the same industry are generally subject to similar economic events and market conditions (De Franco et al., 2011). Therefore, the previous literature in the field of accounting comparability found out that the financial statements of those firms are more comparable (e.g. De Franco et al., 2011; Peterson et al., 2015). Extending this theory, managers of comparable firms should translate the same economic events into similar notes and contain similar earnings and discretionary accruals. In contrast, dissimilar textual accounting policy disclosures could indicate that the firm influenced its earnings.

This PhD thesis tests the effect of similar textual accounting policy disclosures relative to other firms in the same industry on both accrual-based and real earnings management proxies. The empirical analysis of this research is based on XBRL-formatted data from the SEC EDGAR database. In particular, the data set is limited to the annual financial statements which are submitted with the SEC by form 10-K.

The use of XBRL-formatted data leads to important advantages for this research. For instance, XBRL allows to analyze large amounts of data in a standardized manner since it is machine-readable (Srivastava, 2016). This PhD thesis utilizes this advantage by employing a vector-space model to operationalize the similarity scores of the notes. The 'score' measures the degree of similarity between two text documents. In particular, the similarity of the notes to the accounts is calculated by using an extension of the pairwise cosine measure. This is a commonly used model in several areas of research, e. g. text mining and information retrieval (e.g. Fisher et al., 2010; Sultan et al., 2014; Loughran and McDonald, 2016). The study of Brown and Tucker (2011) introduced this approach in the field of accounting and finance.

Compared to other countries, the implementation of XBRL standard is already far advanced in the US. The SEC filing system required publicly listed firms to detail tag significant accounting policies in the second year of their respective XBRL adoption (SEC, 2009). Those detail-tagged XBRL filings allow to study different parts of the notes to the accounts. Within the scope of this research, those parts could have slightly different properties regarding disclosure and earnings quality. Therefore, this PhD thesis uses two distinct similarity scores of the notes to the accounts. The first one is based on the full set of accounting policy disclosures, while the second score only measures textual similarity of revenue recognition disclosures. Revenue recognition disclosures are used, as they contain information about a firm's future earnings (Altamuro et al., 2005). The previous literature examined the properties and benefits of financial statements comparability (e.g. De Franco et al. 2011; Sohn, 2011; Zhang, 2012; Peterson et al., 2015). However, no theory has been put forward to explain the interaction between similarity of the notes to the accounts and earnings management behaviour. This PhD thesis draws on empirical findings and theories from closely related areas of research, e.g. accounting comparability, disclosure quality and disclosure complexity.

The empirical results of this PhD thesis show that the level of textual similarity of accounting policy disclosures across firms of the same industry could explain whether firms have flexibility to manage earnings. The findings of this research will be important for the users of financial statements, such as shareholders and banks, but also financial analysts or investors who analyze the financial reporting prior to the purchase of shares. Moreover, the results of this research will also be of great interest for certified public auditors who are personally liable for their audit certificate. There will also be

implications for the legislator, accounting standard setters and policy makers, such as accounting literature and accountancy professions.

1.2 Inspiration and Motivation

The following section outlines the inspiration and motivation for this research. It describes the nature of the research topic and its contextualization.

There have been several accounting scandals in the United States, e.g. the Enron case and the WorldCom debacle (Jiraporn et al., 2008). The management of those firms manipulated the earnings and deceived the firm`s stockholders. Therefore, the identification and reduction of earnings management is a major subject in the principal agent relationship. This PhD thesis is based on the idea that firms with more similar notes to the accounts relative to industry peers conduct less earnings management.

The notes to the accounts provide qualitative information to the firm`s stockholders (Li, 2010). This information is otherwise not presented on the face of the financial statements (FASB, 2012). Especially the financial notes, e.g. about accounting policy choices, present valuable information regarding the firm`s current and future earnings (Tucker, 2015). Thus, the disclosure quality might have an impact on the evaluation of the earnings by the users of the financial statements. This research finds that textual similarity scores are an additional aspect of disclosure quality.

As outlined in the introductory section, firms within the same industry are generally comparable in their business characteristics. Following this, the previous literature in the field of accounting comparability states that firms within the same industry have more comparable accounting figures (e.g. De Franco et al., 2011; Peterson et al., 2015). Standard setters have long stressed the importance of financial statement comparability as one of the key qualitative characteristics that enables users to evaluate earnings and the financial situation of firms (IASB, 2010; FASB, 2010; FASB, 1980). However, they did not analyze the qualitative characteristics and the influence of the notes to the accounts.

The majority of literature in the field of accounting comparability concentrated on the accounting comparability across countries and across firms audited by the same auditor (e.g. Barth et al., 2012; McMullin, 2014). Further, Chu et al. (2018) analyzed the accounting comparability of a specific firm in the time series. In contrast, there is only

little research on within-industry comparability (e.g. De Franco et al., 2011; Peterson et al., 2015).

Beside the literature in the field of accounting comparability, there are several papers about disclosure quality and disclosure complexity (e.g. Peterson, 2012; Bozanic and Thevenot, 2015; Tucker, 2015; Chen et al., 2015; Bushee et al., 2018). According to Tucker (2015), users of financial statements and experienced auditors should be better able to detect earnings management if a firm adopts industry-specific accounting policies. Further, the accounting policy disclosures are more similar with industry peers if a firm adopts industry-specific accounting policies. By extending the existing research, this PhD thesis finds that textual similarity scores are an additional aspect of disclosure quality.

The previous research in the field of disclosure complexity found out that more complex disclosures increase the propensity to manage the earnings (Peterson, 2012). The study of Peterson (2012) introduced the manipulation theory. According to this theory, managers opportunistically influence earnings when disclosures are more complex. This is due to the fact that the accounting information is less transparent for users of financial statements if the disclosures are more complex. This PhD finds that dissimilar notes to the accounts are a part of accounting complexity, as it increases the uncertainty about qualitative information and impairs the users' understanding of the reported earnings.

In result, the disclosure quality literature and the manipulation theory suggest that more transparent and less complex notes to the accounts are negatively related to earnings management. It became apparent that there is gap in the accounting literature regarding the research about the association between the textual similarity of the notes and earnings management. This research explores if similarities of the notes can capture earnings quality.

This PhD thesis is also motivated by the growing number of XBRL-formatted accounting data (Hoitash and Hoitash, 2018). The machine-readable XBRL technology allows analyzing financial reporting data in a more efficient way (Chychyla and Kogan, 2015). Big data can be analyzed in a standardized manner. The availability of accounting data in XBRL format constantly improved over the previous years (Hoitash and Hoitash, 2018). Especially the XBRL filing system with the SEC offers data for empirical research according to Basoglu and Clinton (2015). The SEC EDGAR system specifies the

particular industry of a firm according to a two-digit SIC code. This industry-specific SIC code allows to analyze the within-industry similarity of the notes in a standardized manner.

1.3 Research Questions

In line with comparability theory, firms in the same industry should have more similar notes to the accounts. Firms in the same industry are generally subject to the same economic events and market conditions (De Franco et al., 2011; Peterson et al., 2015). There is extensive literature regarding the presentation, clarity and readability of the notes to the accounts (e.g. Loughran and McDonald, 2014; Bozanic and Thevenot, 2015; Tucker, 2015). However, empirical research thus far assumes that a theoretical relation between textual similarities of the notes and earnings quality in the same industry probably does not exist (Peterson et al., 2015).

The significance of textual similarity research might be underestimated in the field of accounting and finance. For instance, it is unexplored which factors influence the textual similarity of the notes to the annual accounts.

There are different possibilities to measure the similarity between two textual documents. Especially the field of information retrieval and text mining introduced effective methods for the measurement of textual similarity (e.g. Fisher et al., 2010; Sultan et al., 2014; Loughran and McDonald, 2016). However, textual similarity scores are fairly new in accounting and finance research. Consequently, it needs to be found out how the similarity of notes to the accounts can be measured in an effective way.

In summary, the objectives of this PhD thesis are to examine the following research questions:

(1) Which factors determine similarity of the notes to the accounts between firms of the same industry?

(2) How can the similarity of textual notes to the accounts be measured in an effective way?

(3) How are similar financial notes to the accounts of firms in the same industry and year associated with accrual-based earnings management activities in the following year?

(4) How are similar financial notes to the accounts of firms in the same industry associated with real earnings management activities?

1.4 Outline of Methodology

The following section gives a short overview about the underlying methodology and the adaption of a statistical approach in the field of accounting research.

Accounting comparability research is based on the idea that firms of the same industry possess similar accounting due to their exposure to a same set of economic events (De Franco et al., 2011; Peterson et al., 2015). Most papers studying the benefits of accounting comparability apply a comparability measure, which is derived from an earnings response coefficient framework as developed by De Franco et al. (2011). This is an output-based accounting comparability indicator which is based on earnings itself (Peterson et al., 2015). Due to this fact, an input-based accounting similarity score may be better suited for exploring the association between the notes to the accounts and earnings management. Therefore, this PhD thesis extends the existing research by considering similarities in accounting inputs, such as accounting policies as an additional proxy for accounting comparability.

Due to the lack of existing theory about textual similarity scores of the notes, the empirical analyses begin with a validation test in order to find out what factors determine similarity of the notes to the accounts. The required data to conduct this research is obtained from XBRL-tagged 10-K filings submitted with the SEC EDGAR database in the US. Since the year 2009 publicly listed firms are required to detail tag significant accounting policies (SEC, 2009). Those detail-tagged XBRL filings allow to study different parts of the notes to the accounts. Therefore, this PhD thesis uses two similarity scores of the notes to the accounts. The first one is based on the full set of accounting policy disclosures, while the second score only measures textual similarity of revenue recognition disclosures.

In order to operationalize the textual similarity scores, this PhD thesis employs a vector space model. It is otherwise known as cosine similarity measure and it is also used by internet search engines (Cilibrasi and Vitanyi, 2007). The cosine similarity measure is commonly used in several areas of research, e.g. information retrieval and text mining (e.g. Fisher et al., 2010; Sultan et al., 2014; Loughran and McDonald, 2016). The study

of Brown and Tucker (2011) introduced this approach in the field of accounting and finance.

In adaption to Brown and Tucker (2011), the similarity score of the notes to the accounts is an aggregated word-choice similarity measure. In particular, this similarity score takes the mean of all pairwise firm cosine combinations within the same industry and year of each firm.

1.5 Categorization and Contribution of this Research compared to previous Studies

This section summarizes the development of accounting research and points out the significance of this PhD thesis.

The notes to the accounts provide qualitative accounting information (FASB, 2012). Further, the notes are an important source for users of financial statements when assessing a firm's profitability in its respective competitive environment (Li, 2010). Especially information about accounting policy choices improve the understanding of a firm's current and future earnings (McMullin, 2014).

More similar accounting policy disclosures of firms relative to industry peers should be especially beneficial for users of financial statements. This is due to the fact that it increases the comparability of qualitative accounting information across firms. As a result, similarity in accounting policies may positively affect the ability to evaluate a firm's earnings more accurately. Thus, this research regards the similarity of accounting policy disclosures as an important qualitative characteristic of financial statements.

This thesis concludes that firms that adopt industry-specific accounting policies have a better disclosure quality and are more transparent in how they conduct their business. There is a higher comparability of accounting information if firms use accounting policies that comply with the industry practice (Tucker, 2015). This enables users of financial statements and external auditors to better detect any accrual-based earnings management activities (Bushman et al., 2016). Further, the adoption of industry-specific accounting policies reduces the opportunities to implement accrual-based earnings management. In summary, it can be stated that the adoption of industry-specific accounting policies might constrain managers from accrual-based earnings management and that it leads to more similar notes. Therefore, this PhD thesis contributes to the disclosure

quality research and states that textual similarity scores may represent an additional aspect of disclosure quality.

Beside the literature about accounting comparability and disclosure quality, there is another stream of research analyzing disclosure complexity (e.g. Peterson, 2012; Bushee et al., 2018). This PhD thesis also draws on the findings of the disclosure complexity research to explain the interaction between similarity of the notes and earnings management behaviour. The literature in the field of disclosure complexity introduced the manipulation theory (Peterson, 2012). Dissimilar notes to the accounts are a part of accounting complexity, as it increases the uncertainty about qualitative information and impairs the users' understanding of the reported earnings of a firm. This PhD thesis contributes to the literature on disclosure theory by introducing similarity scores of the notes as an additional aspect of disclosure quality and disclosure complexity.

Furthermore, the second hypothesis of this PhD thesis states that high-within-industry similarity of the notes to the accounts may negatively affect real earnings management activities. In line with the manipulation theory, Hunton et al. (2006) find that managers are opportunistically managing real activities by selling available-for-sale securities if the transparency of comprehensive income disclosures is low. As outlined above, similar notes to the accounts improve the transparency and quality of financial reporting information. This PhD thesis concludes that more similar notes restrict managers to conduct real earnings management. Further, it finds that a reduced propensity to implement earnings management is particularly beneficial with regard to real cash flow elections. Real earnings management is less likely to draw the attention by auditors or regulators compared to accrual-based earnings management (Chi et al., 2011; Roychowdhury, 2006).

This study contributes to the accounting comparability research by using an input-based accounting similarity score. Most papers studying the benefits of accounting comparability apply a comparability measure developed by De Franco et al. (2011). This output-based comparability score captures how well two firms map similar economic events into accounting figures (Peterson et al., 2015). However, De Franco et al. (2011) is based on earnings. Therefore, an output-based comparability score is not appropriate for examining the association between the notes to the accounts and earnings management. This research extends the previous literature by using an input-based accounting simi-

larity score. In particular, similarities in accounting inputs, such as accounting policies are considered as an additional proxy for accounting comparability.

This thesis contributes to the theory by analyzing the within-industry comparability on firm-year level. In contrast, the prior studies in the field of accounting comparability focused on the comparability across firms audited by the same auditor and across countries (e.g. Barth et al., 2012; McMullin, 2014).

Furthermore, this research contributes to the theory by analyzing different parts of the notes to the accounts. Those particular parts of the notes could have slightly different properties regarding disclosure and earnings quality. As outlined above, the previous research did not examine if there is an impact of the qualitative accounting information from different parts of the notes on the earnings quality. Further, they did not consider textual similarities of the notes as an aspect of disclosure quality. This PhD thesis uses two similarity scores of the notes to the accounts. The first one is based on the full set of accounting policy disclosures, while the second score only measures textual similarity of revenue recognition disclosures. Revenue recognition disclosures are used, as they contain information about a firm's future earnings. In essence, revenue recognition is a universal accounting issue (Peterson, 2012) and misreported revenues are one of the most common reasons for restatements (GAO, 2002; GAO, 2006).

However, the above described examination of particular parts of the notes is only possible since detail-tagged disclosures in XBRL format are available on SEC EDGAR database. Beside the opportunity to study different parts of the notes, the use of XBRL-formatted accounting data leads to further advantages for this research. A big advantage of XBRL is that the data is not aggregated. In contrast to other data sources, e.g. Compustat, the information is truly presented "as reported" or filed by the firm with the SEC. Hence, there is no risk of biased information or a lack of information through subjective aggregation (Hoitash et al., 2018). Moreover, XBRL allows to analyze large amounts of data in a standardized manner since it is machine-readable. However, it is necessary to adopt an appropriate similarity measurement approach in order to use these important advantages.

Since textual similarity scores are fairly new in accounting research, the empirical part of this thesis required to find out how the textual similarity of the notes can be measured in an effective way. As outlined above, the advantages of machine-readable XBRL for-

mat should be utilized. This PhD thesis employs a vector space model in order to operationalize the textual similarity scores. It is otherwise known as cosine similarity measure or mean cosine measure (Cilibrasi and Vitanyi, 2007). The study of Brown and Tucker (2011) introduced this approach in the field of accounting and finance. This thesis extends the existing literature in the field of accounting comparability research by following a new approach.

A big advantage in using the mean cosine measure is that a researcher does not have to make difficult case-by-case decisions, such as which accounting policies to focus on and how to account for variations across firms. However, a shortcoming of this approach is that the mean cosine measure increases with disclosure length (Brown and Tucker, 2011). The longer a pair of textual notes, the higher is the probability that a word exists in both documents. In order to control for this effect, two important modifications were implemented in the model. First, a term frequency-inverse document frequency (TF-IDF) algorithm was used. Through this, frequently used and unimportant stop words should not dilute the similarity scores used in this research (Brown and Tucker, 2011). Second, the cosine similarity measure was combined with 'WordNet'. This is a lexical reference software which provides a large collection of synonyms. Despite the fact that the use of 'WordNet' increases the runtime, it leads to more precise results since synonyms are considered during the process of measurement of similarity. This PhD thesis contributes to the theory by analyzing the advantages and disadvantages of cosine similarity measure in the field of accounting comparability research.

This research leads to novel theoretical knowledge by analyzing which factors determine similarity of the notes to the accounts. As stated above, the previous literature did not consider textual similarity scores as an aspect of disclosure quality. Given that textual similarity scores are fairly new in accounting research, the empirical part of this PhD thesis begins with a validation test in order to find out how certain factors influence the textual similarity of the notes

According to the results of this validation test, bigger firms contain more similar notes to the accounts. Further, it is shown that firms that are being audited by a specialist auditor seem to contain more similar notes to the accounts. This finding complies with the previous literature in the field of disclosure quality (Dunn and Mayhew, 2004). Specialist auditors are familiar with the accounting practice of the firm and industry according to Dunn and Mayhew (2004). This might ensure that the audited firm uses industry-

specific accounting policies. In the same vein, the validation test proves that high-quality auditors also improve the textual similarity of the notes to the accounts. Thus, this PhD thesis contributes to the theory by stating that high-quality auditors may improve the accounting information environment as measured by similar accounting policy disclosures of firms.

Beside the positive findings regarding the factors firm size, specialist and high-quality auditors, the test results also show that disclosure complexity negatively influences the similarity of the notes. In particular, industry-adjusted higher absolute deviations in text length impair similarity of the notes to the accounts. Moreover, the research findings show that firms with more volatile sales revenues over the past five years, longer cash-to-cash cycles, and higher absolute price-sales multiples compared to the industry-year median have less similar notes to the accounts.

Overall, the conducted validation test indicates that similarity of the notes is mainly related to factors that capture economic comparability between firms within the same industry. The test results support the reasoning of this PhD thesis that similar notes to the accounts could proxy for better disclosure quality and capture differences in the application of accounting policies across firms. Consistent with the predictions of this research, the hypotheses test shows that similarity of the notes to the accounts is significantly negative related to accrual-based earnings management. There are various ways offered under US GAAP to manage the accruals either upwards or downwards (Ronen and Yaari, 2008). Further, accruals reverse over time. Consequently, a certain direction of managed accruals is not expected by this PhD thesis as opposed to other research papers. Instead, absolute discretionary accruals as proposed by Dechow et al. (1995) and Cohen et al. (2008) are used as a dependent variable in the first hypotheses test. The empirical results prove that both similarity scores, the full set of accounting policy and revenue recognition disclosures are appropriate to explain differences in abnormal levels of accruals. This PhD thesis makes an empirical contribution on the relationship between similarities of the notes and accrual-based earnings management.

As outlined above, real cash flow elections are more difficult to detect. This might also be true regarding the hypotheses test of the relationship between textual similarities of the notes to the accounts and real earnings management. Therefore, this PhD thesis includes three real earnings management proxies in the hypotheses test. First, an aggregated real earnings management measure is utilized to proxy for real earnings manage-

ment. Firms might use various techniques of real earnings management and an aggregated measure might reduce measurement errors in each variable. Second, real earnings management activities are measured by abnormal discretionary expenses such as R&D, SG&A, or advertising expenses. Third, real earnings management is proxied by abnormal production costs.

When analyzing the effect of similarity of the notes on real cash flow elections, the two similarity scores of the notes to the accounts are negatively associated with all of those three real earnings management proxies. The empirical results show that managers of firms with more similar notes do also conduct less real earnings management activities.

In conclusion, this PhD thesis has empirical impacts and contributes to the theory and practice. It proves empirically that similarities in accounting policy disclosures of firms within the same industry are negatively associated with accrual-based and real earnings management conducted by firms. Users of financial statements might turn their attention to similarities in the application of accounting policies across industry peers, since it should improve their assessment of a firm's performance and earnings quality.

1.6 Structure

The following section walks through the content of this PhD thesis and describes the aims of each chapter.

The structure of this thesis is divided into seven chapters. This chapter (chapter one) provides an overview about the aims and objectives of this research. It also discusses the motivation for conducting this study. Moreover, it introduces the research questions, outlines the methodology and points out the contributions of this research.

The remainder of this PhD thesis proceeds as following. Chapter two includes the literature review which critically analyzes and discusses the previous literature. Further, it aims to identify research gaps in prior studies. In particular, literature from closely related areas of research, e.g. earnings management, accounting comparability, XBRL technology, disclosure quality and disclosure complexity are reviewed in this chapter.

In the course of the further study, chapter three points out the decision about the research approach and the methodology. This chapter also discusses the research philosophy and ethical issues of the present PhD thesis. In particular, it explains the different

research paradigms and points out the positivism standpoint of this study. Further, chapter three outlines the deductive approach of this research. The methodology chapter also includes the consideration of any ethical issues in order to conduct research in accordance with the University`s requirements as well as the code of ethics defined by the professional chamber of auditors.

Chapter four examines the benefits of accounting comparability and analyzes the different research approaches employed by previous studies. In particular, it points out the research problem and develops the hypotheses. This chapter summarizes how the study of literature, theories and empirical results from closely related areas of research led to both hypotheses of this thesis. The first hypothesis states that firms with more similar notes to the accounts compared to firms in the same industry and year, conduct less accrual-based earnings management. The second hypothesis focuses on real earnings management. It states that firms with similar notes to the accounts compared to firms in the same industry conduct less real earnings management.

Further, chapter five discusses the methods and the research design of this PhD thesis. It explains the measurement of textual similarity through vector space models. Moreover, it points the advantages and disadvantages of the employed cosine similarity measure. Chapter five also explains which modifications were implemented in order to remedy shortcomings of this model. In another section, it introduces the proxies for earnings management activities and the variables of the regression analysis. Further, the underlying data set obtained from XBRL-tagged 10-K filings from the SEC is described.

The empirical results of this PhD thesis are presented in chapter six. It provides descriptive statistics about all variables used in this study. Given that textual similarity scores are fairly new in accounting research, chapter six includes a validation test in order to find out how certain factors influence the textual similarity of the notes. Further, the results of conducted robustness tests, e.g. the t-statistics, F-values and adjusted R-squared are discussed. In order to answer the remaining two research questions, chapter six presents and explains the results of the hypotheses test. It also discusses the connection between the empirical results and the findings of the literature review.

Finally, chapter seven concludes this thesis. It summarizes the main findings and inferences from the empirical analyses. Further, it presents the contribution of this research to theory and practice. Also, chapter seven describes the limitation of the work. This chapter is closed by recommendations for future research.

2 Literature Review

This chapter points out the results of the literature review. It provides an overview about both theory and empirical findings in the different areas of research that relate to this PhD thesis.

2.1 Introduction

During the last decades researchers from different countries undertook a significant number of studies about earnings management (Dechow et al., 1995; Dechow and Skinner, 2000; Graham et al., 2005; Peterson, 2012). They analyzed accrual-based methods, real cash flow decisions and classification shifting (Cohen and Zarowin, 2010; Roychowdhury, 2006). Since the last mentioned does not influence the net income of a firm, it is hard to prove this phenomenon within an empirical research. Therefore, it is excluded from the scope of this PhD thesis. Previous research found out that disclosure quality and disclosure complexity have an impact on the managers' propensity to manipulate the earnings. Accounting scandals, such as the Enron case and the WorldCom debacle, demonstrated the negative consequences of earnings management (Jiraporn et al., 2008). Therefore, it is an important issue for users of financial statements, standard setters and accounting regulators (IASB, 2010; FASB, 2010).

In order to mitigate such opportunistic influence on the earnings, the literature points out the importance of effective monitoring (Mallin, 2007). The previous research in the field of corporate governance examined the impact of ownership structures, external auditing and the audit committee on the restriction of earnings management (Visvanathan, 2008; Krishnan and Lee, 2009). Further, there is a growing number of studies about the properties and benefits of accounting comparability (De Franco et al., 2011; Peterson et al., 2015). However, there is only little research about the qualitative information through the notes and the possible effects of textual similarity. Especially the detail-tagged XBRL notes from SEC filings provide additional opportunities to evaluate the earnings quality (Dhole et al., 2015).

This chapter is organized as follows: the next section reviews the previous literature about earnings management. It is divided into five subsections. The first subsection examines definitions of the term earnings management. Since both variants are subject to this PhD thesis, section 2.2.1 includes accrual-based as well as real earnings manage-

ment. The second subsection analyzes theoretical frameworks that have been used to explain the phenomenon of earnings management. This review is divided into two parts: firstly the agency theory and secondly the decision-making theory. The third subsection examines several methods of measuring the earnings quality. In particular, this includes the review of empirical studies about measurement of real earnings management and accrual-based earnings management. The fourth subsection points out the motives for earnings management. The impacts of corporate governance tools on earnings management are discussed in the fifth subsection. This is divided into four parts. The first one provides an overview about the development of corporate governance tools. The second part examines the role of external auditors regarding the monitoring and avoidance of earnings management. It is followed by a subsection that reviews the literature about the influence of audit committee and the independent financial expert. The fourth and last part analyzes the relationship between ownership structure and earnings management. In this context, the impact of managerial ownership, institutional and foreign investors is discussed.

The remainder of this chapter proceeds as follows: section three reviews the literature about the notes to the accounts. It is divided into four parts. While the first part analyzes the disclosure quality literature, the second one discusses the phenomenon of disclosure complexity. The latter one includes the review of the literature about manipulation theory. The third part examines the role of the notes to the accounts in communication theory. In particular, it outlines how the qualitative disclosures by the notes can reduce information asymmetries. The fourth and last part analyzes the previous research that is related to similarity of the notes to the accounts. It reviews literature about several factors that might determine textual similarity of the notes.

Section four discusses the development of XBRL standard in accounting. This includes the XBRL conversion of filings with the SEC. Further, section five reviews the literature about accounting comparability research. Finally, section six summarizes and concludes this chapter by confirming the gap in the literature.

2.2 Earnings Management

2.2.1 Defining Earnings Management

In general, the accounting literature distinguishes between accrual-based and real earnings management (Cohen and Zarowin, 2010; Graham et al., 2005; Roychowdhury, 2006). There is further research that found a third type called classification shifting (e.g. Yun et al., 2010; Athanasakou et al., 2011; McVay, 2006). This aims to increase the earnings by shifting expenses to certain items (Athanasakou et al., 2011). In contrast to accrual and real earnings management, it does not influence the amount of reported earnings. This means the amount of net income remains unchanged through classification shifting. It influences only the core earnings (Yun et al., 2010). In particular, the classification shifting aims to increase the earnings by shifting expenses to certain items. For instance, the management qualifies certain costs as extraordinary expenses in order to increase the ordinary earnings. Financial analysts and investors focus generally on the amount of ordinary earnings and the ratios depending on these earnings (Athanasakou et al., 2011). Thus, classification shifting can be utilized to influence financial analysis and investors` decisions. Since classification shifting does not influence the amount of net income, it is hard to prove this phenomenon within an empirical research. Consequently, classification shifting is excluded from the scope of this PhD thesis.

Accrual-based as well as real earnings management have been subject to extensive research. According to Dechow and Skinner (2000), accrual-based earnings management employs accounting policy choices in order to influence the earnings. Accounting policy choices are within the legally defined scope (Cohen and Zarowin, 2010). Therefore, accrual-based earnings management activities have to be distinguished from illegal accounting fraud. While accrual-based earnings management adopts legal accounting reliefs, accounting fraud leads to a violation of legal provisions (Dechow and Skinner, 2000). In result, accounting policy choices can be employed in accordance with US GAAP. However, there are critical voices stating that earnings management might be unethical (Jiraporn et al., 2008). For instance, it is unethical if managers reduce the R&D expenses and release employees in the R&D division.

Against the background that earnings management does not violate against US-GAAP, it decreases informativeness of the financial statements (Jones, 2011). The study of

Hasnan et al. (2008) found out that the accounting will not provide a true and fair view of the firms´ financial situation if the management influenced the earnings. Further, their study indicates that there is a relationship between earnings management and accounting fraud. According to Hasnan et al. (2008), managers make sequential decisions. Their study shows that there are cases where firms first implemented earnings management followed by fraudulent accounting. Thus, it is of crucial importance to restrict the management from manipulating the earnings. Otherwise, there remains a risk that they precede with accounting fraud in a further step. This risk is also illustrated by the four stages in the left column of the following overview.

Table 1: Distinction between earnings management and accounting fraud

(Adapted from Dechow and Skinner, 2000, p. 239)

	Accounting Choices	**Real Cash Flows Choices**
	Within Gapp	
"Conservative" Accounting	- Overly aggressive recognition of provision or reserves.	- Delaying sales.
	- Overvaulting of acquired in-process R&D in purchases acqusitions.	- Accelerating R&D or advertising expenditures.
	- Overstatement of restructuring charges and asset write-offs.	
"Neutral" Accounting	- Earnings that result from a neutral operation of the process.	
	- Understatement of the provision for bad debts.	- Postponing R&D or advertising expenditures.
"Aggressive" Accounting	- Drawing down provisions or reserves in an overly aggressive manner.	- Accelerating sales.
	Violate GAAP	
"Fraudulent" Accounting	- Recording Sales before they are "realisable".	
	- Recording fictitious sales.	
	- Backdating sales invoices.	
	- Overstating inventory be recording fictitious inventory.	

The table above does not only provide an overview about accrual-based earnings management and accounting fraud, but also real earnings management. There are several authors analyzing real earnings management (e.g. Bartov, 1993; Herrmann et al., 2003; Zarowin and Oswald, 2005; Roychowdhury, 2006; Osma 2008). As outlined on the right column of table 1 real earnings management activities are based on real cash flow elections (Roychowdhury, 2006). There is extensive literature about the phenomenon of discretionary expenses (e.g. Zarowin and Oswald, 2005; Osma 2008). This term includes the unexpected reduction of R&D, selling, general and administrative as well as advertising expenses (Osma, 2008). Discretionary expenses are difficult to distinguish from ordinary business activities. For instance, the reduction of advertising expenses can take place due to economic reasons or in order to manipulate the earnings. Thus, the users of financial statements cannot monitor discretionary expenses.

Beside the mechanism of discretionary expenses, there is a further stream of research papers studying the influence on earnings by the timing of asset disposals (Bartov, 1993; Herrmann et al., 2003). Especially long-lived assets offer opportunities to manipulate the earnings through the timing of asset disposals according to Bartov (1993). He examined the timing of asset disposals from a sample of 73 firms in the machinery and equipment industry. The findings of Bartov (1993) indicate that managers opportunistically influence the earnings upwards by the timing of asset disposals. This result is in line with the study of Herrmann et al. (2003). They found out that managers choose the timing of assets in order to clear up their wrong earnings forecasts.

Moreover, sale and lease back transactions belong to the real cash flow elections (Commerford et al., 2016; Healy and Wahlen, 1999). Those transactions constitute a special variant of leasing contracts. In general, a firm sells its real estate to a leasing company while agreeing lease payments for the future use. Thus, the firms´ earnings are influenced upwards in the short-term. If there is a high amount immoveable property issued in the firms` balance sheet, sale and lease back transactions can be used to manage the earnings (Healy and Wahlen, 1999).

Following the above outlined distinction between accrual-based and real earnings management, there is another distinguishing criterion. This is the temporal aspect of implementation of earnings management. Several researchers examined the timing when accrual-based activities or real cash flow elections take place. The findings of Subramanyam (1996) indicate that accrual-based earnings management activities are generally

implemented at the end of the fiscal year. This is in line with the findings of Gunny (2010) who conclude that accounting policy choices are made during the preparation of the annual financial statements. Therefore, Dechow and Skinner (2000) argue that managers know the preliminary earnings for the fiscal year at the time when the decision about accrual-based earnings management activities is made. This means that managers can targeted influence the earnings up- or downwards. For instance, the managers know at the end of the fiscal year if the earnings have to be manipulated upwards in order to meet certain financial ratios. Following this, several researchers argue that the net income might be influenced according to comply with investors´ expectations or financial covenants (e.g. Gunny, 2010; Subramanyam, 1996; Ahmad-Zaluki et al., 2011).

Contrary to accrual-based earnings management activities, real cash flow elections can take place throughout the entire fiscal year (Roychowdhury, 2006). This offers greater temporal flexibility to the management. Consequently, real earnings management activities are more difficult to monitor by the external auditor (Ahmed et al., 2002). This increases the probability that it is implemented without scrutiny by the auditor (Commerford et al., 2016). Following this finding, Cohen and Zarowin (2010) found empirical evidence that firms audited by a `Big Four´ auditor prefer real earnings management. In this context, it has to be taken into account that the auditor size is commonly utilized to assess audit quality. Thus, `Big Four´ auditors are supposed to provide high-quality audits in terms of an increased degree of scrutiny (DeFond and Zhang, 2014). Bringing together the quality of auditing and the fact that real cash flow elections offer a higher degree of flexibility, Graham et al. (2005) found an increasing level of real earnings management activities in cases of effective monitoring by the external auditor. While the study of Garven (2015) did not find a significant relationship between the auditor size and a restriction of the use of discretionary accruals, Zang (2012) empirically proved that there is a negative correlation. In particular, he analyzed the development of abnormal production cost in relation to auditor size. His findings show that managers implement real earnings management activities if they are not able to use discretionary accruals without scrutiny of the auditor.

Following the above outlined discussion about the temporal aspects of earnings management, another strand of research has to be taken into account. There are several papers analyzing the substitutive relationship between accrual-based and real earnings management. In general, managers can use both earnings management tools as substi-

tutes. According to the previous literature, the preference for the one or the other can depend on different factors. One of these factors is the audit quality as outlined above. Prior research showed that effective monitoring by the auditor lead to an increasing implementation of real earnings management. Further, restrictions by the legislator or accounting standard setters seem to cause managers` preference for real earnings activities (Cohen et al., 2008). Firms switched from accrual-based earnings management to real earnings activities after the Sarbanes-Oxley Act (SOX) was introduced in 2002 (Cohen et al., 2008). More than 400 CFOs in the United States took part in their survey and interview study. In conclusion, it became apparent that the introduction of accrual accounting restrictions leads to a preference for real earnings management.

According to Zang (2012) managers use both earnings management tools as substitutes in order to achieve earnings targets. In order to empirically prove this phenomenon, his sample only includes a subset of firms that are likely to meet reporting goals. There are cases where a firms´ earnings are not high enough to comply with the agreed reporting goals. Therefore, managers of the analyzed firms implement either accrual-based or real earnings management activities in order to meet the financial ratios.

Moreover, the findings of Zang (2012) indicate that the decision to conduct real earnings management depends on the relative costs of accrual-based earnings management and vice versa. For instance, the informativeness of the financial statements increase if a firm adopts industry-specific accounting policies. This should lead to more comparable accountings compared to industry peers. Further, the financial reporting of the current and the previous year are better comparable through the higher transparency. Consequently, there is a higher probability that accrual-based earnings management is monitored by the auditor. In result, more comparable and transparent accounting information leads to increasing costs of accrual-based earnings management.

Following the research results of Zang (2012), it would also be conceivable to observe a positive correlation between manipulating real activities and similar notes to the accounts. If similarity of the notes increases accounting quality, it correspondently represents a component of the relative costs of accrual-based earnings management. However, studying this research question would require limiting the data sample to a subset of firms that are likely to meet reporting goals as in Zang (2012). In contrast, this research includes a range of firms with divergent incentives. Thus, it is not possible to examine the substitutive relationship between both types of earnings management. Rather it is

analyzed whether similar notes constrain firms from managing earnings overall. However, the existence of the above discussed substitutive relationship between accrual-based and real earnings management has to be taken into account. This is especially true since this PhD thesis includes both types of earnings management.

2.2.2 Theories of Earnings Management

2.2.2.1 Agency Theory

The prevailing view in literature explains the phenomenon of earnings management by the principal-agency theory (e.g. Marens and Wicks, 1999; Rutherford et al., 2005; Laffont and Martimort, 2002; Cornett et al., 2008). According to Marens and Wicks (1999), the principal-agency theory describes the shareholders as the principals, whereas the managers are classified as agents. The principals provide the capital and the agents control the firm. In result, ownership and control of the corporation are separated.

The principal-agency theory generally states that the principals aim to motivate the agents to act in accordance with their interests. In particular, the principals want to maximize the welfare of their investment, e.g. the shareholder value. However, the agents are supposed to have their own interests, which are contradictory to the welfare maximization of the principals. The agents are generally at the head of the firm for a limited time. Due to this fact their planning horizon for the development of the firm might be short. This could encourage them to maximize their self-interests instead of the shareholders welfare during this period (Marens and Wicks, 1999).

Further, the principal-agency theory states that the relationship between the shareholders and the managers is characterized through asymmetric information (Wongsunwai, 2013). Since agents control the firm, principals are generally not involved in the day-to-day business. Thus, the latter ones have less information. In result, the principals can not be sure about the motives and backgrounds of management decisions. For instance, the reduction of advertising expenses might be caused through economic reasons or to opportunistically manipulate the earnings.

The above outlined uncertainties and the incomplete information of the principals lead to the so called principal-agency conflicts. In particular, it can be distinguished between two types of conflicts (e.g. Laffont and Martimort, 2002; Rutherford et al., 2005). In

this context, the corporate governance literature distinguishes between adverse selection (Laffont and Martimort, 2002) and moral hazard problems (Rutherford et al., 2005). The first mentioned problems occur prior to the conclusion of the contract with the agent while the last mentioned problems arise during the contract period, thus after the selection of the manager (Fama, 1980).

In particular, adverse selection describes the problem that the shareholders cannot be sure that the agent, who they have chosen, is able to manage the firm in accordance with their interests. This problem is caused through the information asymmetry. For instance, the manager may lie regarding their qualifications and experiences during the selection process. The corporate governance literature describes this phenomenon as `hidden characteristics´ (Laffont and Martimort, 2002). Moreover, the agent could hide his true motivation during the election process. This is also known under the term `hidden intentions´ (Rutherford et al., 2005). Consequently, the shareholders might choose an agent who does not aim to maximize their welfare, but his self-interests. These could be e. g. own enrichment, prestige, self-fulfillment and show of his force (Visvanathan, 2008). Further, it can regularly be observed that the agents want to raise their own monument through the disclosure of high earnings before they leave the firm (Laffont and Martimort, 2002). Therefore, effective monitoring is of crucial importance during the financial periods prior to changes of personnel on the level of the top management. In this context, earnings management activities constitute an instrument for the agents to fulfill their self-interests (Balsam, 1998).

The moral hazard problems occur through the human behaviour in the economic environment. Previous research found out that each rational individual aims to maximize its self-interests if there is a possibility to do so (Rutherford et al., 2005). Therefore, this is also true for the managers. Indeed, the self-interests of the managers are not corresponding with the interests of the principals, namely the maximization of their welfare (Jiraporn et al., 2008). As a result, the actions of the agents in order to increase their own benefits lead to disadvantages for the shareholders (Visvanathan, 2008).

In conclusion, adverse selection and moral hazard problems cause negative consequences for the shareholders. In order to avoid opportunistic behaviour and actions by the management, effective monitoring is required. However, this leads to additional costs for the shareholders (Wongsunwai, 2013). As outlined above, information asymmetries in the accounting provide opportunities to manage the earnings. In conclusion, the re-

duction of information asymmetries can avoid principal-agency problems. Due to this fact, better disclosure quality improves the understanding of users of the financial statements and thus, offers a cost-effective monitoring tool.

2.2.2.2 Decision-making Theory

There exists another theoretical explanation of earnings management beside the principal-agency relationship. This is the decision-making theory. It includes different schools of thought, e.g. psychology, social science and economics (Ricciardi and Simon, 2000). Several researchers analyzed the relationship between the decision-making theory and earnings management (e.g. Gowda and Fox, 2002; House et al., 2004; Bazerman and Moore, 2013). According to the findings of House et al. (2004), the process of how managers make their decisions has an impact on earnings management activities. Thus, the following section aims to find out if the decision-making theory provides an appropriate explanation of earnings management.

In general, it can be stated that the activity of decision-making is essentially connected with the management (Simon, 2012). The psychology literature distinguishes between different kinds of decision makers. For instance, the study of Rowe and Boulgarides (1983) introduced four forces of values and perceptions that characterize the decision makers. Following this paper, there are analytic, conceptual, directive and behavioural decision-makers. These four forces are illustrated in figure 1 below.

Figure 1: Decision style model (Rowe and Boulgarides, 1983)
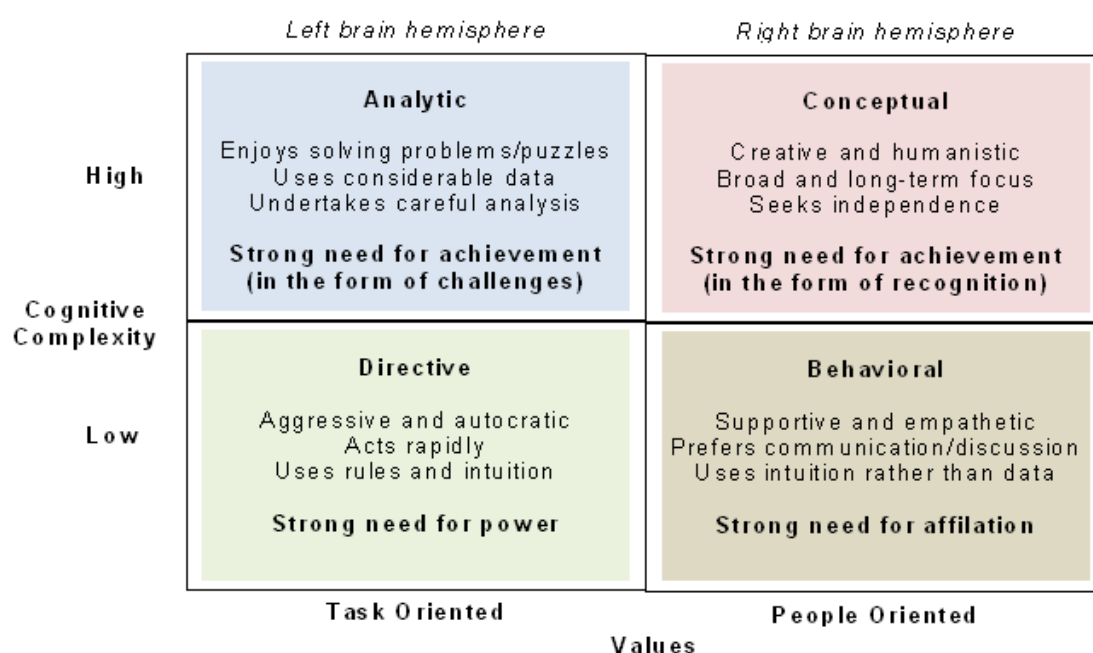
The above shown classification was derived from the typology of needs (Rowe and Boulgarides, 1983). This typology was originally developed by McClelland (1962). He stated in his early research that behaviour is related to the individual`s need for power and achievement. Depending on the intensity of those needs, there are analytic, conceptual, directive and behavioural decision-makers. While the analytic one takes substantial data into account and performs careful analysis before making decision, the conceptual decision-makers are more creative. Regarding the time horizon, conceptual decision-makers are focused on long-term decisions. According to Rowe and Boulgarides (1983), the process of directive decision-making is driven by the need for power of management. However, this limits the possibility of alternative management decisions (Rowe and Boulgarides, 1983). Finally, Rowe and Boulgarides (1983) states that the behavioural decision-makers do not take data into account. Instead, they discuss the issue of decision and use their intuition to make decisions.

The study of Gowda and Fox (2002) explained earnings management behaviour by analyzing how humans make their decisions. By following the research of Ralston et al. (1997), they focused on certain factors that might influence the decision-making process in the management. For instance, Gowda and Fox (2002) analyzed the knowledge of managers, cultural backgrounds and ethical values. Their results show that the knowledge of management and ethical values of the individual managers might play a key role. With regard to the implementation of earnings management, there are further factors that influence the decision-making process. For instance, financial expertise and risk awareness have a direct impact on the decision to manage the earnings (Robbins and Coulter, 2017).

By following the above outlined typology of needs, several researchers concluded that individual`s need for power is the main driver for earnings management activities (e.g. Kuang et al., 2014; Byun and Roland-Luttecke, 2014). The potential risk of losing power reduces the inhibiting threshold to implement earnings management. For example in case of wrong earnings forecasts, the directive decision makers will probably influence the earnings in order to maintain their own power (House et al., 2004). This is in line with the study of Barber and Odean (1999) who examined the aggressive and autocratic behaviour of directive decision makers. The aggressive and autocratic behaviour is a result of the need for power (Bazerman and Moore, 2013). Directive decision makers are more focused on their self-interests (Tian et al., 2005). This group of decision mak-

ers has a higher propensity to implement earnings management, which in turn enables them to fulfill their self-interests.

Previous research in the field of decision-making theory partially explained the manipulation of earnings through the phenomenon of overestimation. According to Mahaja (1992), human beings tend to overestimate their own skills. This is particularly true for executives (Ricciardi and Simon, 2000). The psychological experiment of Fishchhoff et al. (1977) analyzed the phenomenon of overconfidence in the management. Their results demonstrated a clear tendency of overconfidence amongst executives in the US. In order to assess if there is a case overestimation, different criteria such as education, industry experience and firm affiliation of the managers is taken into account. Especially the duration of affiliation with a firm increases overestimation amongst managers (Caramanis and Lennox, 2008). In result, the propensity to manage the earnings rises over time. According to the study of Caramanis and Lennox (2008), this is related to an increasing self-confidence. The managers feel entitled to influence the earnings up or downwards.

2.2.3 Measuring Earnings Management

There are several researchers who focused on the detection of earnings management activities. They introduced different approaches to measure earnings management. In general, there is a distinction between the detection of accrual-based earnings management and real earnings management. Therefore, this research firstly examines the approaches to measure accrual-based activities and secondly the real cash flow elections. The following two sections summarize the most important findings by the previous literature.

2.2.3.1 Measurement of Real Earnings Management

Following the accounting literature, there are mainly four models to measure real cash flow elections. These models are based on the following aspects:

- discretionary expenses

- time when assets are sold

- sales revenues

- production costs

In general, there are two approaches to measure discretionary expenses manipulation. While the first one estimates the abnormal level for each transaction or activity, the second approach focus on the sum of activities. There are several studies utilizing the first approach (e.g. Osma, 2008; Osma and Young, 2009; Gunny, 2010), but also the second one (e.g. Roychowdhury, 2006; Cohen et al., 2008; Cohen and Zarowin, 2010; Chi et al., 2011).

According to Gunny (2010), the level of a firm`s normal R&D expenses can be estimated by analyzing a single transaction of discretionary expenses. In this context, he developed the following model:

$$\frac{RD_{i,t}}{A_{t-1}} = \alpha_0 + \alpha_1 \frac{1}{A_{t-1}} + \beta_1 MV_{i,t} + \beta_2 Q_{i,t} + \beta_3 \frac{INT_{i,t}}{A_{t-1}} + \beta_4 \frac{RD_{i,t-1}}{A_{t-1}} + \varepsilon_{i,t}$$

Where the variables are defined as described in the following:

Variable	Definition
RD $_{i,t}$	Research and development expenses of the year t.
A $_{t-1}$	Total assets at the end of the prior year.
MV $_{i,t}$	Natural log of market value of equity of the year t.
Q $_{i,t}$	Q defined by Tobin as firms' market value divided by replacement cost of its assets of the year t.
INT $_{i,t}$	Internal funds, a proxy for reduced funds available for investment.

In addition to the estimation of the normal level of R&D expenses, Gunny (2010) also focused on the normal level of SG&A (selling, general and administrative) expenses. For this purpose, he employed the research findings of Roychowdhury (2006) by developing the model presented below. It follows the approach that the level of a firm`s normal SG&A expenses can be estimated by analyzing a single transaction of discretionary expenses.

$$\frac{SGA_{i,t}}{A_{t-1}} = \alpha_0 + \alpha_1 \frac{1}{A_{t-1}} + \beta_1 MV_{i,t} + \beta_2 Q_{i,t} + \beta_3 \frac{INT_{i,t}}{A_{t-1}} + \beta_4 \frac{\Delta S_{i,t}}{A_{t-1}} + \beta_5 \frac{\Delta S_{i,t}}{A_{t-1}} \cdot DD + \varepsilon_{i,t}$$

The variables of this model are defined as following:

Variable	Definition
SGA $_{i,\,t}$	Selling, general and administrative expenses of the year t.
S $_{i,\,t}$	Total amount of sales of the year t.
DD	Dummy variable equaling to 1 when there is a decrease of sales revenue between current year and previous year and zero otherwise.

As described above, the second approach focuses on the normal level of the sum of discretionary expenses. For instance, Roychowdhury (2006) presumes that the normal level of the sum of discretionary expenses is a linear function of contemporaneous sales. Therefore, he developed the following model based on the research of Dechow et al. (1998).

$$\frac{DISEXP_{i,t}}{A_{i,t-1}} = \alpha_0 + \alpha_1 \left(\frac{1}{A_{i,t-1}} \right) + \beta \left(\frac{S_{i,t}}{A_{i,t-1}} \right) + \varepsilon_{i,t}$$

However, there is the following shortcoming of this regression. The normal level of discretionary expenses is wrongly estimated if a firm`s sales are increased to manage the earnings upward during any year. In order to avoid this shortcoming, Cohen et al. (2008) estimated the discretionary expenses as a function of lagged sales. Therefore, a cross-sectional regression for each fiscal year and industry is utilized to estimate the normal level of discretionary expenses. The adjusted model by Cohen et al. (2008) calculates the normal level of discretionary expenses as following:

$$\frac{DISEXP_{i,t}}{A_{i,t-1}} = \alpha_0 + \alpha_1 \left(\frac{1}{A_{i,t-1}} \right) + \beta \left(\frac{S_{i,t-1}}{A_{i,t-1}} \right) + \varepsilon_{i,t}$$

The variable is defined as following:

Variable	Definition
DISEXP $_{i,\,t}$	The sum of R&D, SG&A and advertising expenses for firms within the industry i at the fiscal year t.

Based on the estimated coefficient calculated by the above presented regression, the abnormal level of discretionary expenses can be determined. In result, this is the difference between the firm`s actual sum of discretionary expenses and the normal level calculated by the model of Cohen et al. (2008).

Further, Gunny (2010) introduced another model to detect real earnings management activities. This focuses on the timing of asset sales. Especially long-lived assets offer a flexibility regarding the exact time of sale. Moreover, there are special financing models such as sale and lease back transactions. In order to measure if a firm manipulated the asset sales, Gunny (2010) developed the following cross-sectional regression:

$$\frac{GainA_{i,t}}{A_{t-1}} = \alpha_0 + \alpha_1 \frac{1}{A_{t-1}} + \beta_1 MV_{i,t} + \beta_2 Q_{i,t} + \beta_3 \frac{INT_{i,t}}{A_{t-1}} + \beta_4 \frac{ASales_{i,t}}{A_{t-1}}$$
$$+ \beta_5 \frac{ISales_{i,t}}{A_{t-1}} + \varepsilon_{i,t}$$

This model follows the research of Bartov (1993) and Herrmann et al. (2003). The regression is run for each year and industry. According to Gunny (2010), a significant high residual indicates asset sales manipulation. The variables are defined as following:

Variable	Definition
GainA $_{i,t}$	The gain from asset sales of a firm i in the year t.
ASales $_{i,t}$	Total income from sales of long-lived asset of a firm i in the year t.
ISales $_{i,t}$	Total income from of long-lived investment sales of a firm i in the year t.

Firms might influence the amount of reported earnings upwards by sales manipulation. According to Roychowdhury (2006), this will decrease the operating cash flows in the current fiscal year. Due to this fact, the study of Roychowdhury (2006) suggests that sales-based real earnings management activities can be measured by estimating the normal level of cash flows. Following the research of Dechow et al. (1998), the normal level of cash flow from operating activities can be estimated as a linear function of sales and change in the amount of sales in the same fiscal year. Therefore, Roychowdhury (2006) developed the following cross-sectional regression in order to detect sales-based

real earnings management. His regression can measure sales-based activities for each year and industry.

$$\frac{CFO_{i,t}}{A_{i,t-1}} = \alpha_0 + \alpha_1 \left(\frac{1}{A_{i,t-1}} \right) + \beta_1 \left(\frac{S_{i,t}}{A_{i,t-1}} \right) + \beta_2 \left(\frac{\Delta S_{i,t}}{A_{i,t-1}} \right) + \varepsilon_{i,t}$$

The variables are defined as described in the following:

Variable	Definition
CFO $_{i,\,t}$	The amount of cash flows from operating activities of a firm i in the period t.
A $_{t-1}$	Total assets at the end of the prior year.
S $_{i,\,t}$	Total amount of sales of the year t.

Another opportunity to measure real earnings management activities is offered by the production-based approach. This focuses on the estimation of the normal level of production costs. Previous research found out that firms might reduce the costs of goods sold by increasing the production volume (Roychowdhury, 2006; Cohen et al., 2008). This approach follows the idea of the experience curve model. It was introduced by the Boston Consulting Group (BCG) in 1967. The experience curve model states that the firm`s production costs per unit are reduced up to 30 percent by doubling the total production volume. This means that a firm producing more units than other ones has a cost-based advantage in competition.

Figure 2: The experience curve (adopted from Mankiw and Taylor, 2017)
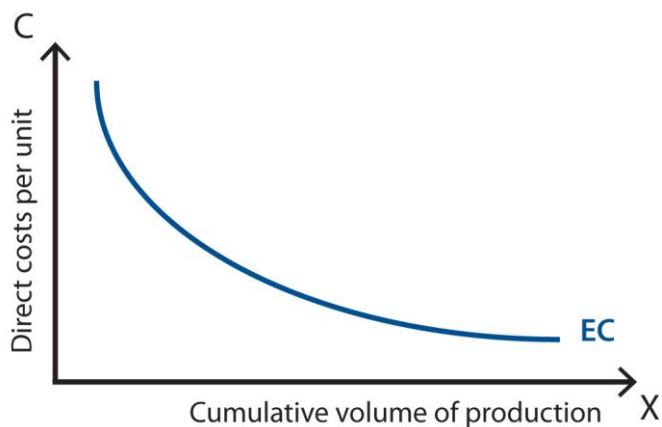
It has to be stated that the experience curve effect shown in the figure above does not follow an automatism (Mankiw and Taylor, 2017). The firm has to utilize the following potential benefits:

- The increasing amount of produced units might enable the firm to get cheaper purchasing conditions for the required material resources.

- The higher the amounts of produced units, the employees improve their working processes. In result, there are less rejects and the production time per unit decreases.

- Since there are fixed costs of a firm, the increasing amounts of produced units lead to a reduction of the cost per produced unit.

- There is an inverse relationship between the amount of produced products and the research and development costs per unit.

- The lower costs per produced unit may not be passed on to the sales market. This means that the sales prices are not reduced.

In order to measure if a firm manipulated the production costs, Roychowdhury (2006) developed the following model:

$$\frac{COGS_{i,t}}{A_{i,t-1}} = \alpha_0 + \alpha_1 \left(\frac{1}{A_{i,t-1}} \right) + \beta \left(\frac{S_{i,t}}{A_{i,t-1}} \right) + \varepsilon_{i,t}$$

It is based on the research of Dechow et al. (1998) and estimates the normal level of a firm`s production costs. The variables are defined as following:

Variable	Definition
COGS $_{i,\,t}$	Sum of costs of goods sold for firms i in the year t.
Δ INV $_{i,\,t}$	Change in inventory for firms i at the end of year t.

According to Roychowdhury (2006), the normal level of change in inventory is estimated by the following cross-sectional regression:

$$\frac{\Delta INV_{i,t}}{A_{i,t-1}} = \alpha_0 + \alpha_1 \left(\frac{1}{A_{i,t-1}} \right) + \beta_1 \left(\frac{\Delta S_{i,t}}{A_{i,t-1}} \right) + \beta_2 \left(\frac{\Delta S_{i,t-1}}{A_{i,t-1}} \right) + \varepsilon_{i,t}$$

In result, Roychowdhury (2006) defines the production costs (PROD i, t) as sum of COGS i, t and $\triangle$ INV i, t. He measured the normal level of production costs by the following cross-sectional regression:

$$\frac{Prod_{i,t}}{A_{i,t-1}} = \alpha_0 + \alpha_1 \left(\frac{1}{A_{i,t-1}}\right) + \beta_1 \left(\frac{S_{i,t}}{A_{i,t-1}}\right) + \beta_2 \left(\frac{\Delta S_{i,t}}{A_{i,t-1}}\right) + \beta_3 \left(\frac{\Delta S_{i,t-1}}{A_{i,t-1}}\right) + \varepsilon_{i,t}$$

2.2.3.2 Measurement of Accrual-based Earnings Management

According to the previous research, there are two relevant approaches to measure accrual-based earnings management activities. The paper of McNichols and Wilson (1988) introduced the so called specific accruals approach. More recent research of Dechow et al. (1995) found another approach which is known as aggregated accruals approach in accounting literature. The first one focuses on specific accruals of a firm, e.g. bad debt provisions. In contrast, the aggregated accruals approach analyzes the total amount of accruals. In the last decade, the majority of researcher in accounting literature utilized the aggregated accruals approach (e.g. Athanasakou et al., 2011; Bergstresser and Philippon, 2006; Cohen and Zarowin, 2010). Nevertheless, this PhD thesis takes a summarizing view on both approaches for the sake of completeness.

As described above, the specific accruals approach measures accrual-based earnings management by examining the different accruals shown in the following:

Specific accruals	Researcher
Bad debt provision	McNichols and Wilson (1988) found evidence for an association between bad debt provision and discretionary as well as non-discretionary accruals.
Deferred tax assets	Miller and Skinner (1998) hypothesized that deviations in the total amount of deferred tax assets compared with other firms in the same industry is an indicator for the measurement of earnings management.
Claim loss reserve of insurance	Beaver and McNichols (2001) concluded that there is an association between the claim loss reserve of insurance and the implementation of earnings management. If there is a deviation in the total amount of claim loss reserve compared with other firms in the same industry, this might indicate the implementation of earnings management activities.

Critical voices in literature take the view that the above described specific accruals approach lead to incorrect measurement of accrual-based earnings management (e.g. Jones, 1991; Dechow et al., 1995). This is due to the fact that managers have the opportunity to utilize the specific accruals as substitutes. Indeed, earnings might be managed by employing several specific accruals simultaneously (Chi et al., 2011). Therefore, it is not possible to exclude that a firm implemented earnings management activities if one specific accrual was not utilized and thus, cannot be measured.

In contrast, the aggregated accruals approach addresses this shortcoming by analyzing the total amount of accruals. The following sections provide a summarizing overview about the existing models in accordance with the aggregated accruals approaches. In general, there are two different categories of measurement models. Firstly, there are researchers who only focus on the total accruals and secondly the ones who utilize discretionary accruals as a proxy. The latter ones are also described as abnormal accruals in literature (Cohen et al., 2008).

The formula below shows the model introduced by Healy (1985). His calculation is based on the reported earnings reduced by operating cash flows. He separates between discretionary and non- discretionary accruals.

$$NDA_{i,t} = \frac{1}{n} \sum_{\tau} \frac{TA_{i,t}}{TA_{i,t-1}}$$

The variables are defined as following:

Variable	Definition
NDA $_{i,t}$	The estimated amount of non-discretionary accruals of firm i in year t.
TA $_{i,t}$	Total amount of accruals of firm i in year t.
$A_{i,t-1}$	Lagged total asset of firm i in year $t-1$.
N	The sum of years in the estimated period.
T	A year subscript as an indicator for a year in the estimation period.
T	The year t when the action takes place.

One year later, DeAngelo (1986) examined discretionary accruals by utilizing the following model:

$$NDA_{i,t} = \frac{TA_{i,t-1}}{A_{i,t-2}}$$

Where the variables are defined as described in the following:

Variable	Definition
NDA $_{i,t}$	The amount of non-discretionary accruals of firm i in year t scaled by lagged total assets.
TA $_{i,t-1}$	Total amount of accruals in year $t-1$.
A $_{i,t-2}$	Total amount of assets in year $t-2$.

DeAngelo (1986) concluded that there is no change in the amount of non- discretionary accruals throughout the years. However, this has been refuted by Dechow et al. (1995). They also modified the following model introduced by Jones (1991):

$$NDA_{i,t} = \hat{\alpha}_1 \left(\frac{1}{A_{i,t-1}} \right) + \hat{\alpha}_2 \left(\frac{\Delta REV_{i,t}}{A_{i,t-1}} \right) + \hat{\alpha}_3 \left(\frac{PPE_{i,t}}{A_{i,t-1}} \right)$$

The variables are defined as following:

Variable	Definition
NDA $_{i,t}$	The estimated amount of non-discretionary accruals of firm $_i$ in year $_t$.
A$_{i,t-1}$	Lagged total asset of firm $_i$ in year $_{t-1}$.
ΔREV $_{i,t-1}$	Calculated by the revenue in year $_t$ less revenue in year $_{t-1}$ scaled by total assets in year $_t$.
PPE $_{i,t}$	Total amount of property, plant, and equipment of firm $_i$ in year $_t$.
αˆ $_1$; αˆ $_2$; αˆ $_3$	Specific parameters of firm $_i$. These describe the ordinary least squares.

Jones (1991) utilized the following formula in order to calculate the specific parameters αˆ $_1$, αˆ $_2$ and αˆ $_3$ for the firm:

$$\frac{TA_{i,t}}{A_{i,t-1}} = \alpha_1 \left(\frac{1}{A_{i,t-1}} \right) + \alpha_2 \left(\frac{\Delta REV_{i,t}}{A_{i,t-1}} \right) + \alpha_3 \left(\frac{PPE_{i,t}}{A_{i,t-1}} \right) + \varepsilon_{i,t}$$

Variable	Definition
ε $_{i,t}$	This describes the error term in year $_t$, which represents discretionary accruals as a proportion of total accrual for firm $_i$ in year $_t$.

According to the model of Jones (1991), firms manage their earnings downwards in order to utilize benefits of import reliefs. Jones (1991) examined 23 firms located in the US which were subject to the relief investigation. This was undertaken by the International Trade Commission.

Dechow et al. (1995) and Cohen et al. (2008) state that there is a shortcoming of the above described model introduced by Jones (1991). By following the research of Thomas and Zhang (2002), they state that there may be no association between earnings management activities and the variations in discretionary accruals measured by the Jones Model. In fact, these variations are caused through changes in inventory (Thomas and Zhang, 2002). Thus, the Modified Jones Model excludes the effects from inventory changes. They calculate non-discretionary accruals by the following model:

$$NDA_{i,t} = \alpha_1 \left(\frac{1}{A_{i,t-1}}\right) + \alpha_2 \left(\frac{\Delta REV_{i,t} - \Delta REC_{i,t}}{A_{i,t-1}}\right) + \alpha_3 \left(\frac{PPE_{i,t}}{A_{i,t-1}}\right)$$

The only new variable is defined as following (and the remaining variables are already defined above):

Variable	Definition
ΔREC	The calculated net receivables in year t less than net receivables in year $t-1$.

For the sake of completeness, the so called 'industry model' is shown in the following:

$$NDA_{i,t} - \beta_1 + \beta_2 median_i \left(\frac{TA_{i,t}}{A_{i,t-1}}\right)$$

Where the variables are defined as described in the following:

Variable	Definition
Median $_i$ (TA $_t$)	The median is calculated by the sum of total accruals in year t scaled by lagged total assets for all non-sample firms in the same industry (two digit-SIC code) and year.
β_1 and β_2	The specific parameters for the firm are calculated by using ordinary least square (OLS) on the observations in the estimation period $_t$.

Similar to DeAngelo (1986), the 'industry model' takes the incorrect assumption that there is no change in the amount of non- discretionary accruals throughout the years. Therefore, researchers do not utilize this model nowadays.

Sok-Hyon and Sivaramakrishnan (1995) realized that there might be further issues which have an impact on the estimation of non- discretionary accruals. For instance, they argued that the issue of omitted variables is not addressed by the previous models. Therefore, they introduced the following model in 1995:

$$AB_{i,t} = AB_{i,t}^* + DA_{i,t} = AR_{i,t}^* + ARB_{i,t}^* + DEP_{i,t}^* + DA_{i,t}$$

$$= \phi_0 + \phi_1 \left[\delta_1 REV_{i,t}^*\right] + \phi_2 \left[\delta_2 EXP_{i,t}^*\right] + \phi_3 \left[\delta_3 GPPE_{i,t}^*\right] + \beta PART_{i,j} + \upsilon_t$$

Sok-Hyon and Sivaramakrishnan (1995) established the following auxiliary calculation in order to estimate the specific variables for this model.

$$v_t = \varphi_t + \varpi_t + \xi_t + \varepsilon_t$$

$$\delta_1 = \frac{AR_{i,t-1}^*}{REV_{i,t-1}^*}, \delta_2 = \frac{APB_{i,t-1}^*}{EXP_{i,t-1}^*}, \delta_3 = \frac{DEP_{i,t-1}^*}{GPPE_{i,t-1}^*},$$

The variables are defined as following:

Variable	Definition
AB $_{i,t}$	The total amount of accruals balance of firm i in year t.
DA $_{i,t}$	The total amount of managed accruals of firm i in year t.
AR $_{i,t}$	Total amount of accounts receivable of firm i in year t.
APB $_{i,t}$	Total amount of account balance of firm i in year t. This sum relates to the expenses, e.g. depreciation.
DEP $_{i,t}$	Total amount of depreciation of firm i in year t.
REV $_{i,t}$	Net sales revenues of firm i in year t.
EXP $_{i,t}$	The total amount of operating expenses of firm i in year t. This includes the cost of goods sold and selling and administrative expenses.
GPPE $_{i,t}$	Gross sum of property, plant, and equipment of firm i in year t.
PART $_{i,t}$	This describes the partitioning variable for the firm i in year t that captures factors that allegedly motivate earnings management.

The most recent model was introduced by Kothari et al. (2005). Their performance-matched approach estimates the discretionary accruals as follows:

$$TA_{i,t} = \alpha_0 + \alpha_1 \frac{1}{A_{i,t-1}} + \alpha_2 \frac{\Delta Sales_{i,t}}{A_{i,t-1}} + \alpha_3 \frac{PPE_{i,t}}{A_{i,t-1}} + \alpha_4 \left(ROA_{i,t \, (or \, t-1)} \right) + \varepsilon_{i,t}$$

Where the variables are defined as described in the following:

Variable	Definition
$ROA_{i,t}$	The total amount of return on asset of firm i in year t.
$\Delta SALES_{i,t}$	This describes the difference in the total amount of sales of firm i in year t and year $t-1$.
$PPE_{i,t}$	Total amount of property, plant, and equipment of firm i in year t.

As described in the table above, Kothari et al. (2005) utilize the return on asset (ROA) as a proxy to consider the financial performance of a firm. Moreover, Kothari et al. (2005) suggest that including an intercept can help in controlling for heteroscedasticity.

In summary, this section provides an overview about the existing models to measure earnings management activities. It demonstrates that there are various proxies to measure for earnings management. However, it must be taken into account that there are different aspects of earnings quality. Hence, it is required to use different measurements in order to proxy for certain aspects of earnings quality. This research takes into account that not all those aspects of earnings quality are related to the similarity of the notes. By following many previous studies, this PhD thesis uses abnormal levels of total accruals as a proxy for accrual-based earnings management.

Within the scope of this research, abnormal accruals are measured using the cross-sectional modified Jones Model for each industry-year as proposed by Dechow et al. (1995) and Cohen et al. (2008). Abnormal accruals are also described as discretionary accruals. As outlined above, the modified Jones Model excludes the effects from inventory changes when measuring the total accruals.

Further, unsigned discretionary accruals are used in this research since a certain direction of managed accruals cannot be expected and accruals reverse over time. Otherwise, the scope of this analysis would be limited to the detection of either upwards or downwards managed accruals.

To validate the empirical results, accrual-based earnings management is additionally measured by using the performance adjusted modified Jones Model according to Kothari et al. (2005). The adoption of this alternative proxy and unsigned discretionary

accruals should ensure that this PhD thesis does not lead to any random or biased results.

With regard to the measurement of real earnings management, this PhD thesis follows the approach of Roychowdhury (2006). According to the review of extant literature, this is the most commonly used and appropriate approach for measurement of real earnings management (Zang, 2012). As explained above, this research takes into account that not all aspects of earnings quality are related to the similarity of the notes. This is also true for real earnings management.

As opposed to accrual-based earnings management, real cash flow elections mainly aim to increase the earnings. By cutting discretionary expenses such as R&D costs or by overproducing inventory, firms report lower costs of goods sold. Therefore, signed abnormal production costs and discretionary expenses are used to measure real earnings management in this PhD thesis.

2.2.4 Motives for Earnings Management

There are several researchers examining the motives for earnings management. In order to restrict the management from manipulating the earnings, it is not sufficient to detect individual actions. Rather, it is of crucial importance to know the motives for earnings management. Prior research analyzed different motives for earnings management activities (Healy, 1985; Schipper, 1989; Beneish, 1999; Jaggi and Picheng, 2002; Giroux, 2003; McKee, 2005). Following the principal-agency theory, the early research of Healy (1985) examined the impact of bonus plans on earnings management. His sample included 239 US firms. Healy (1985) pointed out that managers influence the earnings to maximize their annual bonus awards. In line with this, Schipper (1989) found out that private gains are the main reason for the influence on the earnings by the management. This means that managers opportunistically maximize their own benefits. In correspondence with that, the study of Beneish (1999) indicated that earnings were increased in order to reach performance based management compensation. Therefore, the propensity to manipulate the earnings increases if there is a high proportion of variable compensation. Beneish (1999) found out that managers reached their performance based compensations by cutting discretionary expenses such as R&D costs.

Following the above outlined result that earnings management can be motivated by private gains, Giroux (2003) examined the earnings of firms with a high degree of insider trading. His findings show earnings overstatement amongst those firms. Thus, it can be concluded that managers overstate the earnings in order to maximize their capital gains from insider trading.

In the same vein, there is research about the relationship between earnings management and the occurrence of a management buyout (Perry and Williams, 1994; Marquardt and Wiedman, 2004). The management aims to buy the company through those transactions. Thus, income decreasing earnings management can reduce the purchase price for the managers. Using a sample of 175 management buyouts, Perry and Williams (1994) found evidence that the announcement of those transactions is related with income decreasing discretionary accruals. Following this approach, Marquardt and Wiedman (2004) analyzed a large sample of 1290 firms where management buyouts take place. Their results indicate a postponement of revenue recognition in order to reduce the purchase prices. In conclusion, the announcement of a management buyout can be a motivating factor for earnings management.

Moreover, there is another strand of research analyzing the relationship between earnings management and the compliance with financial ratios. The research of Jaggi and Picheng (2002) found out that earnings were influenced upward in order to comply with financial covenants. Thus, the implementation of earnings management can be motivated by reporting goals. If the operative earning power is not sufficient to meet the agreed financial benchmarks, there is a higher propensity to influence the earnings. This is in line with the study of Gunny (2010) who observed an increasing probability of earnings overstatement if there is a danger to violate debt covenants. The management is responsible for potential consequences from a violation against debt covenants. The fear of any penalties compared with justifications towards the shareholders can motivate the management to implement earnings management activities.

Beside the maximization of private gains and the pressure to meet financial ratios, regulatory policies can also influence the earnings management behaviour. According to the previous literature, there is a relationship between regulatory policies and the manipulation of the earnings (Watts and Zimmerman, 1978; Cahan, 1992). For instance, the study of Watts and Zimmerman (1978) found out that firms which are subject to anti-trust investigation are likely to manage their earnings downwards. Further, Cahan

(1992) stated that adverse political investigations, e.g. subsequent to accounting scandals, motivate managers to employ discretionary accruals in order to decrease the income.

According to Cohen et al. (2008), restrictions by the legislator or accounting standard setters seem to influence the motivation to implement earnings management activities. Overall, their findings indicate that the manipulation of earnings decreased after SOX was introduced in 2002. It restricts the various opportunities to manage the earnings. In contrast, more flexible accounting rules increase the motivation to influence the earnings either upwards or downwards (Ronen and Yaari, 2008). This corresponds with the findings of Ipino and Parbonetti (2017) who analyzed the earnings management behaviour during the IFRS adoption. In conclusion, it became apparent that there is a negative relationship between earnings management and accounting restrictions by the legislator or standard setters.

Furthermore, the prior research found out that import reliefs can be a motivating factor to influence the earnings. The study of Jones (1991) examined the earnings of firms across five different industries during the investigation period for import reliefs. His findings show that firms aim to report lower income during the investigations by the International Trade Commission. Depending on the defined thresholds for import reliefs, the management is motivated to influence the earnings downwards. In conclusion, the results of Jones (1991) show that firms have a higher propensity for income-decreasing earnings management during investigation periods.

There is another strand of research analyzing the relationship between earnings management and seasoned equity offerings. The study of Rangan (1998) analyzed the financial performance in the years surrounding the equity offerings. Using a sample of 230 firms, his results show that the discretionary accruals are significantly positive before the equity offerings. A later research by Shivakumar (2000), using a large sample of 1222 firms with equity offerings, provides empirical evidence for earnings management around equity offerings. His results prove there are abnormal high discretionary accruals prior to the offering year and significantly negative ones subsequent to the equity offering. In conclusion, it became apparent that the announcement of seasoned equity offerings motivates the mangers to overstate the earnings.

In addition, the existing literature also addresses the postponement of tax payments as a motivating factor for earnings management (McKee, 2005). There is a direct impact of earnings management activities on the tax burden of a firm. Earnings management allows to influence the amount of taxable income upwards or downwards (Beneish, 1997). This enables firms to postpone the timing of tax payments. According to Bond and Xing (2015), managers aim to improve the liquidity of the firm by manipulating the earnings. In fact, the postponement of tax payments in later periods causes a positive liquidity effect in the current fiscal year. Conversely, it leads to negative liquidity effects for the tax administrations.

In conclusion, it became apparent that the maximization of private gains is the main motivating factor for the management to manipulate the earnings. However, there exist many other motivating factors that can influence the earnings management behaviour. For instance, the announcement of management buyouts and seasoned equity offerings lead to the implementation of earnings management. Further, the pressure to comply with agreed financial ratios and debt covenants motive the management to influence the earnings.

2.2.5 Impacts of Corporate Governance Tools on Earnings Management

2.2.5.1 The Development of Corporate Governance Tools

The implementation of earnings management leads to negative consequences for the firm and its stakeholders in the long-term (Cohen and Zarowin, 2010; Osma, 2008). Accounting scandals in the past showed that earnings management can even threaten the existence of a firm. Thus, the avoidance of earnings management plays a significant role regarding the development of a firm (Cao and Laksmana, 2010). In this context, the following section shows that corporate governance tools might have a positive impact on the implementation of earnings management.

The importance of corporate governance issues grew rapidly over the past fifty years. Firms realized the priority of internal governance in order to ensure a stable long-term performance (Greenough and Clapman, 1980). In the mid of the 1970s there was the first reform agenda by the SEC officially addressing 'corporate governance'. Manageri-

al accountability was brought to attention of the public with SEC proceeding against the management of Penn Central in the year 1974.

According to the prevailing view in literature, there occur negative consequences from earnings management activities (Cohen and Zarowin, 2010; Cao and Laksmana, 2010; Osma, 2008). For instance, previous research found out that the discretionary expenses could even threaten the existence of a firm in the long-term (Arya et al., 2003; Kothari and Lester, 2012). Earnings management leads to a subsequent decrease of the operating performance (Cohen and Zarowin, 2010). Thus, it is a major concern of the accounting regulators (SEC, 2009). The former SEC chairman Arthur Levitt (1998) expressed this in his famous speech 'Numbers Game'. He early realized the possible extent of earnings management and asked for fundamental changes to restrict managers from manipulating the earnings. In line with these thoughts, the IASB and other accounting standard setters aimed to restrict managers from influencing the earnings (Ewert and Wagenhofer, 2005). As outlined in the following section, the external auditor plays a key role in monitoring the earnings quality.

2.2.5.2 The External Auditor

There are several papers analyzing the role of the external auditor as part of the governance system (e.g. Solomon et al., 1999; Krishnan and Visvanathan, 2008; Kothari and Lester, 2012). Previous research outlined that auditors have the capability to reduce information asymmetries in the financial reporting (e.g. Reichelt and Wang, 2010; Zhang, 2012; Abad et al., 2018). According to Garrett et al. (2014), users of the financial statements consider the reported earnings as more trustworthy if an external auditor attested the financial statements (Garrett et al., 2014). Further, the earnings forecasts of financial analysts are based on attested financial statements of the recent years (Kindleberger and Aliber, 2011; Bozanic and Thevenot, 2015).

The prevailing view in literature concludes that external auditing is of crucial importance for the monitoring of the financial reporting (DeAngelo, 1981; Knapp, 1991; Watkins et al., 2004). According to PCAOB Auditing Standard (AS) No. 12, paragraph 17, the auditor must detect all existing material errors in the financial statements. The term 'material error' means errors that can influence the decisions made by users of the financial statements (Watkins et al., 2004). Prior research showed that the manipulation of the earnings has an impact on the firms´ stakeholders (Dechow et al., 1995). Thus,

the implementation of earnings management leads to an audit finding according to PCAOB Auditing Standard (AS) No. 12, paragraph 17.

In particular, the auditor can restrict the implementation of earnings management by monitoring accounting policy choices. Firms that adopt industry-specific accounting policies are more comparable with industry peers and, as a result, have more transparent financial statements. Thus, users of the financial statements understand better how the accounting of those firms is set up and consequently how the business of those firms is conducted. Further, the increased transparency through the use of industry-specific accounting policies facilitates the detection of earnings management. As a consequence, it is possible to restrict managers from manipulating the earnings.

Due to the above outlined impact of accounting policy choices, the auditor plays a responsible role. According to the PCAOB Auditing Standard (AS) No. 12, paragraph 12, auditors of public companies are supposed to "evaluate whether the company's selection and application of accounting principles are appropriate for its business and consistent with the applicable financial reporting framework and accounting principles used in the relevant industry" (PCAOB, 2010). Pursuant to paragraph 12 of PCAOB (AS) No. 16, auditors should also inform the audit committee about "[…] disclosures of significant accounting policies in controversial areas or […] in areas for which there is […] diversity in practice" (PCAOB, 2012). According to the US Supreme Court, this requires that the auditor is able to recognize accounting policies against industry practices (Arthur Andersen LLP v. United States, 544 U.S. 696, Ruling of May 31, 2005). Otherwise, there would be a low effectiveness of this monitoring mechanism.

By following the PCAOB Auditing Standard (AS) No. 12, paragraph 12, auditors should be familiar with accounting practices of the firm and its industry. From this it can be inferred that it is especially beneficial if an industry-specific specialist auditor is employed. In this context, the industry-specific specialist auditor is defined as an expert who has specialized knowledge in an industry (Zhang, 2012). In particular, this can be auditors with a certain educational background as well as such who have a considerable experience in auditing of firms within an industry. According to Zhang (2012), there are spillover effects from the audits of other firms in the same industry. However, the existence of industry-specific specialist auditors also depends on the concrete characteristics of the industry itself. For instance, there is a higher probability to engage an industry-specific specialist auditor in a widespread industry. As a consequence, management of

those firms should find it difficult to alter accounting policies against industry practices for accrual-based earnings management purposes (Hope, 2003).

In order to ensure an effective monitoring, the auditor must have a holistic view of a firm`s accounting. Beside the use of industry-specific accounting policies, the consistence of accounting policies is of crucial importance (Casell et al., 2018). The auditor must take care that accounting policies are only changed in justified cases. In this context, Healy and Palepu (2001) explain that firms would only change accounting policies in cases, where they adopt new business models. However, this requires that auditing and accounting regulations work perfectly. In an imperfect setting, they argue, managers could make accounting decisions and disclosures in order to manage reported performance. Thus, high-quality audits may lead to a consistence in the accounting compared to peer firms.

Moreover, there is a strand of research analyzing the differences between the detection of accrual-based and real earnings management by the auditor. As suggested by previous research (Chi et al., 2011; Roychowdhury, 2006), real earnings management is less likely to draw attention from auditors or regulators compared to accrual-based earnings management. This result corresponds with the outcomes of a recent study by Commerford et al. (2016). He interviews auditors about real earnings management behaviour of firms. A majority of auditors state that they find it difficult to distinguish real earnings management from ordinary decisions concerning the operating business of a firm. For instance, advertising expenses of firms might be reduced through real cash flow decisions or due to economic reasons. While only the first case employs real earnings management, it is hard to distinguish it from the second one.

By following the above outlined discussion, prior research found out that accounting policy choices generally take place at the end of the financial year, while real earnings management activities can be implemented throughout the entire year (Ipino and Parbonetti, 2017). Due to this fact, there is a lower degree of scrutiny by the external auditor regarding real cash flow elections. In addition, it has to be taken into account that firms make sequential decisions whether to manipulate real activities or to implement accrual-based earnings management activities (Zang, 2012). The study of Zang (2012) found out that manipulating real activities precedes managing accruals. His results show that firms regularly switch from real cash flow elections to accrual-based earnings management, but in rarer cases vice versa. Due to this fact, it is of crucial importance for

auditors to restrict the management from real cash flow elections since this might be the first foray to influence the earnings.

The present research takes this for granted and infers that a key decision to engage in real earnings management during the year is affected by the comparability of audited financial statements of the previous year. In line with the manipulation theory, more sound and similar financial notes to the accounts should lead to more transparent financial statements of firms, which in turn decrease managers' willingness to manipulate the earnings by real cash flow elections.

According to Zang (2012), the decision to conduct real earnings management depends on the relative costs of accrual-based earnings management and vice versa. In the case of this PhD thesis, as already outlined, higher levels of similarity of the notes to the accounts could appear to be especially costly to manage accruals, because the level of scrutiny by users of financial statements or auditors might be higher. More transparent and comparable financial statements in the time series increase the probability of detection of accrual-based earnings management by the auditor. Thus, it would also be conceivable to observe a positive correlation between manipulating real activities and similar notes to the accounts if similar notes represent a component of the relative costs of accrual-based earnings management. However, this study does not include only a subset of firms that are likely to meet reporting goals as in Zang (2012). As a result, the research design of the present PhD thesis does not allow studying this research question, because it includes a range of firms with divergent incentives. Instead, this paper examines whether similar notes to the accounts constrain firms from managing earnings overall.

Beside the monitoring activity and the detection of earnings management, the responsibility of the auditor additionally includes reporting obligations. According to PCAOB Auditing Standard (AS) No. 12, paragraph 17, the auditor has to write an audit report to inform about any misstatements and violations against the accounting principles. Thus, the auditor can restrict the management from manipulating the earnings by publication of audit findings. In particular, the provided information enables shareholders and the supervisory boards to better understand the reported earnings.

In conclusion, it became apparent that auditing can restrict the management from manipulating the earnings. However, there are also researchers complaining about the ef-

fectiveness of external audits. For instance, the study of Knapp (1991) examined how the length of auditor tenure influences the audit quality. While the learning curve effect during the first years improves audit quality, the auditor-firm relationship matures and the audit process might be performed less rigorous (Knapp, 1991). His results indicate that this might offer a lag for the implementation of earnings management without scrutiny of the external auditor. The study of Chi and Huang (2005) found out that the auditor-client relationship gets closer during the years. Managers get familiar with the audit process of a certain auditor or audit firm (Behn et al., 2008). If the auditor-client relationship gets closer over time, the managers could be able to assess the focus of the auditor. The findings of Behn et al. (2008) indicate that there occurs an increasing risk that managers modify or adjust the earnings management activities according to the audit process.

Following the above outlined discussion about the effectiveness of auditing, it is important to specify the factors that imply audit quality. The study of Wooten (2003) summarizes the following factors:

- Skills and qualification of the audit team

- Culture of the engaged audit firm

- Size of the audit firm

- Planning of the audit process

- Factors which cannot be controlled by the auditor

This shows that the nature of audit quality is complex and depends on multiple factors. In line with this result, Balsam et al. (2003) argued that proxies which are used to operationalize the audit quality must also reference to multiple factors. However, there are several papers measuring audit quality by using only the auditor size as a proxy to measure audit quality (e.g. Francis et al., 1999; Davidson et al., 2005). According to Francis et al. (1999), the bigger audit firms are more likely to provide high quality audits. Consequently, they used the 'Big Four' auditing firms as a proxy to measure audit quality. In the same vein, Davidson et al. (2005) analyzed the engagement of industry-specific specialist auditors. Their results show that 'Big Four' auditing firms are more likely to employ industry-specific specialist auditors.

Furthermore, the previous literature states that the independence of the auditor is a key quality criterion of external monitoring. According to Turley et al. (2011), the degree of independence influences the objectivity of the auditors´ report. In this context, Porter et al. (2014) found out that the amount of fees for non-audit services is an important proxy for the auditors´ independence. Following this, it is required to have a critical look at non-audit services in order to ensure the auditors´ independence. Section 201 of the SOX governs a list of non-audit services which are prohibited by law. In particular, it is unlawful if the public accounting firm provides:

(1) bookkeeping or other services related to the accounting records or financial statements of the audit client;

(2) financial information system design and implementation;

(3) appraisal or valuation services, fairness opinions, or contribution-in-kind reports;

(4) actuarial services;

(5) internal audit outsourcing services;

(6) management functions or human resources;

(7) broker or dealer, investment adviser, or investment banking services;

(8) legal services and expert services unrelated to the audit; and

(9) any other service that the Board determines, by regulation, is impermissible.

The figure 3 below shows the SEC's view that lower auditor independence threats the audit quality and thus, the earnings quality might be reduced (SEC, 1999).

Figure 3: The SEC's view of causality

SEC's View

High non-audit service fees → Lower auditor independence → Lower audit quality → Lower earnings quantity
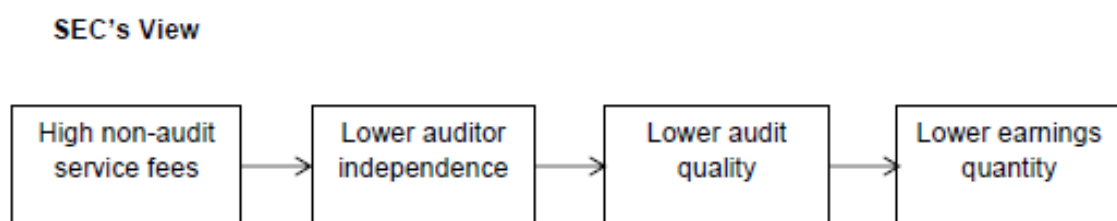
In conclusion, it became apparent that the engagement of an independent, highly quali-fied and experienced auditor is of crucial importance. Further, industry-specific special-ist auditors are especially beneficial since they are able to detect accounting policies against industry practices (Hope, 2003). Consequently, an effective monitoring by the auditor has the capability to restrict the management from manipulation the earnings.

2.2.5.3 The Audit Committee and Independent Financial Expert

There is another monitoring body regarding the financial reporting beside the external auditor. This is the audit committee which is part of the firms´ internal corporate gov-ernance (Abbott et al., 2003). Its members belong to the board of directors (Peasnell et al., 2005). According to § 229.407(d)(5)(ii) of Regulation S-K published by the SEC, the personnel composition of the audit committee should include at least one independ-ent financial expert.

There is a strand of research analyzing the relationship between the oversight role of the audit committee and the implementation of earnings management. Several papers fo-cused on certain characteristics of audit committee with regard to the restriction of earn-ings management (e.g. Klein, 2002; Xie et al. 2003; Bédard et al., 2004; Windram, 2004; Dhaliwal et al., 2010). In particular, they examined the influence of factors such as board size, board activity, independence and competence of members of the audit committee. As outlined in the following, it is expected that higher degree of independ-ence, financial expertise and more frequently meetings increase the efficiency of audit committee work.

According to Bédard et al. (2004), there are the following key factors which determine the degree of independence: First, the members of the audit committee may not have any financial or personal interest with the firm. Second, there should be a separation of responsibility within the board of directors. For instance, the chair of the board of direc-tors and the CEO should not be the same person. Third, it is fundamental to implement an independent nomination committee within the board of directors. This should ensure that independent members with appropriate expertise are nominated.

The research of Klein (2002) found out that the number of outside directors in the audit committee is negatively correlated to the abnormal accruals of a firm. This indicates that outside directors are more objective and work more accurately to reduce the earn-

ings management activities. Xie et al. (2003) observed that the level of discretionary current accruals decreased if the members of the audit committee have financial expertise. Their results show that the monitoring of earnings management is more effective if financial experts belong to the audit committee. These findings are in line with the research of Bédard et al. (2004) who states that there is less opportunistic earnings management if the audit committee consists at least of one outside member with financial expertise. However, there is no association between the size of the audit committee and effectiveness of this governance mechanism according to Bédard et al. (2004). Their results indicate that regular activities of the audit committee are more important than the number of members. This corresponds with Piot and Janin (2007) who find that more frequently meetings of the audit committee can restrict the managers from influencing accruals.

The paper of Song and Windram (2004) points out that interactions with the external auditor on a regular basis have a positive impact regarding the avoidance of earnings management. Their results also confirm that outside directorships and financial expertise reduce the probability of earnings management. However, Song and Windram (2004) did not find evidence for a relationship between the size of audit committee and earnings quality. This corresponds with the study of Cohen et al. (2014) who also conclude that there is no significant effect of board size on earnings quality. However, their results show that industry expertise of the board members improve the effectiveness of monitoring.

According to Vafeas (2005), the length of audit committee tenure has an impact on the independence of members. The findings from 252 US firms show that the length of audit committee tenure might have a negative effect on the monitoring of earnings management. His study points out that the accuracy of oversight work decrease over time (Vafeas, 2005). This is in line with the research of Windram (2004) who concludes that there is an inverse relationship between audit committee tenure and the effectiveness of monitoring. In contrast, the research of Osma and Noguer (2007) indicates that the audit committee tenure has a positive impact on the restriction of earnings management. They found out that there is a learning curve effect over time. This leads to an increased level of knowledge and expertise within the audit committee. Thus, Osma and Noguer (2007) argue that length of audit committee tenure might improve the effectiveness of oversight work. However, they did not take into account that effective monitoring requires a

critical standpoint of the oversight body. According to the findings of Vafeas (2005), the critical standpoint of the audit committee members decreases over time. In conclusion, it can be stated that the length of audit committee tenure negatively influences the monitoring of earnings management.

By following the previous research, Yang and Krishnan (2005) state that there is a negative association between the financial expertise of the members of the audit committee and implementation of earnings management. They state that the criterion of financial expertise is particularly required if the firms´ accounting environment is complex. By following the manipulation theory, the complexity of the accounting increases the scope for implementation of earnings management activities. Therefore, Yang and Krishnan (2005) found out that it is more difficult to constrain the management from manipulating earnings if the accounting environment is complex. They conclude that those cases require an increased degree of scrutiny by audit committee members with financial expertise.

According to Goodwin (2003), it is essential that the audit committee interact with the firms´ internal auditors. His findings show that there is a lower propensity to implement earnings management if the audit committee regularly reviews the reports about internal audit functions. This should ensure the internal monitoring is appropriate to detect earnings management (Gleason et al., 2017). Members of the audit committee should be aware about the content of the internal auditor program. In correspondence with that Gendron et al. (2004) state that the internal control effectiveness should be subject in each meeting of the audit committee.

Furthermore, the previous literature examined the relationship between the work of the external auditor and the audit committee. The study of Bierstaker et al. (2012) observed that the audit committee settles a disagreement between the management and the auditor. For example, if the management refuses to provide necessary information to the auditor. If this information relates to earnings management activities, it can impair the audit process. In result, the auditor might not be able to restrict the management from influencing the earnings. In this case the interaction between the audit committee and the external auditor is of crucial importance for the detection of earnings management. Overall, the study of Bierstaker et al. (2012) concludes that there is a positive impact of the audit committee on the process and quality of auditing.

This is in line with the research of DeZoort et al. (2003). They performed an experimental study to assess the usefulness of the work of the audit committee in case of auditor adjustments in the financial reporting. In conclusion, it became aware that members of the audit committee play a key role regarding the effectiveness of auditing. According to DeZoort et al. (2003), the audit committee can recommend and explain adjustments. In case of findings regarding earnings management, the adjustments can lead to a restatement of financial statements. Thus, auditor adjustments are of crucial importance for the financial reporting quality. Overall, the findings of DeZoort et al. (2003) indicate that the audit committee has a supportive effect on the work of the auditor.

Beside the literature about the positive impact of the audit committee on the auditing process, there are also studies about the beneficial effect in the opposite direction. Prior research found out that high quality audits have a positive impact on the work of the audit committee. The study of Chan et al. (2013) analyzed the relationship between audit reports of the auditor and the work of the audit committee. Their results show that the monitoring function of the audit committee is more effective if there is a comprehensive and informative reporting of the external auditor. This corresponds with the findings of Amin et al. (2018) who analyzed the effect of the SEC's XBRL mandate on the audit report. Their study also demonstrates a positive impact of the audit report on the audit committee work.

Following the discussion above, the audit committee can better restrict the management from manipulating the earnings if the audit report includes information about those activities. For example, auditors should inform the audit committee about "[…] disclosures of significant accounting policies in controversial areas or […] in areas for which there is […] diversity in practice" pursuant to paragraph 12 of PCAOB (AS) No. 16, (PCAOB, 2012). This should ensure that the audit committee gains knowledge of the use of accounting policies against industry practices. This is of crucial importance since firms use accounting policies against industry practices for accrual-based earnings management purposes. Thus, the restriction of earnings management can be improved if there is an effective coordination and communication process between audit committee and the external auditor. Further, it is essential that members of the audit committee have industry expertise (Cohen et al., 2014).

In conclusion, it became aware that effective auditing as well as the work by the audit committee has a positive impact regarding the avoidance of earnings management. In

case of cooperation between the audit committee and the external auditor the probability to restrict the management from manipulating the earnings even increases. The prior literature showed that the interaction between those monitoring bodies leads to a mutually supportive impact on the work of both parties.

2.2.5.4 Relationship between Ownership Structure and Earnings Management

There is another strand of research focusing on the relationship between ownership structure and earnings management. In this context, the prior research focused on the influence of managerial ownership, institutional and foreign investors. According to Jensen and Meckling (1976), managerial ownership constrains managers from manipulating the earnings. Their results show that higher degree of shareholding by managers increase the sensibility for earnings quality. The research of Jensen and Meckling (1976) finds that managerial ownership leads to a more prospective and responsible corporate governance. In summary, the managers are interested in a high shareholder value if they hold shares of the firm. Since earnings management activities lead to a decrease of the shareholder value in the long-term, the executives will avoid the implementation in case of ownership of shares in the firm (Jensen and Meckling, 1976).

In the same vein, Behn et al. (2002) found a positive influence of managerial ownership on earnings management. Their empirical results show an inverse association between the number of shares held by the management and the degree of earnings manipulation. They estimated the discretionary accruals by using the modified Jones Model. In contrast to other studies, Behn et al. (2002) also included real earnings management activities in their analysis. They examined the relationship between shareholding by managers and R&D manipulations. In order to measure the real earnings management activities Behn et al. (2002) used the ratio of total R&D expenses to amount of total sales. However, their results did not show empirical evidence for an association between real earnings management and managerial ownership. Thus, Behn et al. (2002) concluded that managerial ownership is related to accrual-based earnings management, but not to real earnings management.

In contrast to the above outlined literature, there are also studies about decreasing earnings quality through managerial ownership. Warfield et al. (1995) analyzed the impact of shareholding by the management on the absolute abnormal accruals. They measured

the managerial ownership by the percentage of shares held by directors, executive officers or their close family members, e.g. wife and children. Warfield et al. (1995) estimated the abnormal accruals by using model introduced by DeAngelo. In addition, they even estimated the abnormal accruals by using the Jones Model in order to proof their result. Both models showed that the shareholding by managers lead to a higher degree of earnings management. Warfield et al. (1995) explained their negative results through short-term shareholding of the management. In this case, managers only focus on dividend distributions. Earnings management activities enable them to maximize their dividend income.

By following the research of Warfield et al. (1995), there is another study by Wang (2006). He also found out that managerial ownership and shareholding by family members of the executives have negative impact on earnings management. Wang (2006) estimated the abnormal accruals by using the model introduced by Dechow and Dichev (2002). In correspondence with Warfield et al. (1995), the short-term objectives of the management are also used by Wang (2006) in order to explain the empirical results. Since earnings management causes a decrease of the shareholder value in the long-term, managerial ownership cannot restrict the manipulation of earnings in case of short-term shareholding.

Moreover, Bowen et al. (2008) did not find any evidence for an association between managerial ownership and earnings management. They measured the degree of managerial ownership by the percentage of shares held by senior executives. In order to measure earnings management, Bowen et al. (2008) used the abnormal accruals proxy as supposed by the modified Jones Model. However, the empirical research of Bowen et al. (2008) did not provide any significant results as an evidence for an association between ownership structure and earnings management.

Overall, the previous research results about the influence of managerial ownership on the implementation of earnings management in the US are varying. The existing literature shows that there are different strategies regarding the investment horizon and income maximization. Thus, it is not appropriate to make a valid statement about the impact of shareholding by managers and earnings quality.

There is another strand of research focusing on the relationship between institutional investors and earnings management. Institutional investors are expected to be more

qualified and experienced regarding the analysis of financial statements (Rajgopal et al., 1999). Further, they might have the financial capability to engage sophisticated financial analysts in order to acquire and process financial information (Nordberg, 2011). Thus, they can gain deeper insights regarding the financial information of a firm (Bartov et al., 2000; Mallin, 2007). Compared to individual investors, the investment volume of institutional investors is normally higher. As a consequence, the institutional investors do not only have financial influence but also voting power in a firm. This enhanced influence of institutional investors enables them to keep pressure on the management (Bartov et al., 2000).

Previous research observed a growing attention to the group of institutional investors by the management (Mallin, 2007; Bartov et al., 2000). There are firms where regular meetings between the management and the institutional investors take place (Mallin, 2007). Thus, institutional investors gain more information than individual investors. This is in line with the findings of Rajgopal et al. (1999) who concluded that institutional investors make their investment decisions on a better information basis.

There are several researchers who analyzed the influence of institutional investors on corporate governance. According to Cassell et al. (2018), the group of institutional investors plays an important role concerning the monitoring of earnings management. This is due to the fact that they are able to get deeper insights to the financial reporting than individual investors. Furthermore, institutional investors have the capability to engage sophisticated financial analysts as outlined by Charitou et al. (2007). Thus, there is a higher probability that institutional investors detect manipulations of the earnings according to Charitou et al., 2007. As a consequence, the findings of Charitou et al. (2007) show that firms with a high percentage of institutional investors have better earnings quality.

In the same vein, the research results of Cornett et al. (2008) imply that there is an inverse relationship between shareholding by institutional investors and the degree of earnings manipulation. They measured earnings management by the use of modified Jones Model. The empirical results show an impact of the percentage of shares hold by institutional investors on the earnings quality.

Moreover, there is a study of Yu (2008) analyzing the role of institutional investors regarding the monitoring of earnings management. His empirical results confirm that

shareholding of institutional investors is negatively associated with earnings management. Yu (2008) also measured earnings management by the estimation of discretionary accruals as introduced by the modified Jones Model. He explained his results through an increased level of monitoring by the institutional investors. According to Mehrani et al. (2017), institutional investors have more financial expertise and analyze the earnings more detailed than individual investors. Their study demonstrates a positive association between institutional ownership type and earnings quality.

Beside the examination of the role of institutional investors, there is also research about the influence of foreign ownership on earnings quality. For instance, the study of Aggarwal et al. (2005) found out that foreign investors are more focused on good corporate governance than domestic investors. This is in line with the research of Doidge et al. (2004) who state that foreign investors have well selected investment criteria. Their research results show that foreign investors make their purchase decision more accurate than domestic investors. For instance, they analyze the financial statements of a firm more deeply prior to any investments. This corresponds with the results of Guo et al. (2015) who analyzed the association between foreign ownership and real earnings management. Further, Doidge et al. (2004) point out that foreign investors have an increased level of financial expertise. The due diligence process of investment in shares in other countries requires more financial expertise. The implementation of earnings management increases the risk of the investment. Thus, foreign investors analyze the firms´ earnings quality (Doidge et al., 2004).

By following the above outlined findings, Li (2005) states that foreign investors prefer the purchase shares of firm with good corporate governance. This includes reliable financial statements. Earnings management activities contradict the true and fair view of current financial situation. Thus, foreign investors aim to detect earnings manipulations Li (2005). There are foreign investors who engage sophisticated analysts for their investment portfolio according to Li (2005). Overall, the findings of Li (2005) imply that foreign investors are more experienced to evaluate the earnings quality of a firm. This corresponds with the results of Wang and Seng (2014) who examined the role of foreign institutional investors.

According to Leuz et al. (2009), there is a positive impact of shareholding by foreign investors regarding the restriction of earnings management. Their empirical results show that there is an inverse association between the percentage of shareholding by

foreign investors and earnings manipulation. Leuz et al. (2009) measured earnings management by the use of the modified Jones Model. Their results prove that firms with a higher percentage of shareholding by foreign investors have a lower degree of earnings management. Leuz et al. (2009) explain their findings by more effective monitoring of the earnings quality. Foreign investors analyze the financial statements more accurate and have better financial expertise. This is in line with the findings of Dahlquist and Robertson (2001) who concluded that foreign ownership is a monitoring mechanism regarding earnings management. Their study points out that the management is aware of the increased scrutiny by this group of investors. Thus, the awareness of effective monitoring can also lead to a restriction of earnings manipulations.

Overall, corporate ownership structures might give an indication regarding the implementation of earnings management. Previous research in this area showed that ownership structures, e.g. shareholding by managers, institutional and foreign investors can have an impact on earnings quality. The research results about the influence of managerial ownership on earnings management are varying. However, prior literature pointed out that higher percentage of shareholding by institutional investors might constrain the management from influencing the earnings. Moreover, shareholding by foreign investors has a positive impact on the monitoring of earnings quality. Thus, the level of managerial, institutional and foreign ownership can restrict the implementation of earnings management.

2.3 The Notes to the Accounts

There are several researchers pointing out the importance of the notes to the accounts regarding the firms´ financial reporting. The study of Barth et al. (2008) examined the usefulness of financial statements for the recipients. They used a sample of 57 US firms for their survey research. Their findings show that users of financial statements find it difficult to understand the reported amounts and figures. Thus, Barth et al. (2008) state that there is a risk of wrong interpretations regarding the current financial situation of a firm. In conclusion, their results suggest that the users of financial statements need additional explanations to ensure the understanding of the provided financial data. This corresponds with the findings of Drake et al. (2017). Their study demonstrates the utility of qualitative financial information by the notes to the accounts.

According to the FASB (2012), the notes provide additional information which is otherwise not shown on the face of the financial statements. In contrast to the information presented in the balance sheet or profit and loss account, the notes provide qualitative information about the financial statements (FASB, 2012). Thus, the notes to the accounts increase the transparency of the financial reporting. This increased level of transparency enables the users of financial statements to better understand and interpret the provided information.

In the same vein, the study of Zeff (2007) found out that the notes to the accounts can reduce principal-agency conflicts. His results show that information asymmetries related to the financial statements are reduced by the notes. Zeff (2007) analyzed the financial statements of 173 US firms. The findings imply that the management and the shareholders have more consistent financial information in case of meaningful notes. In line with this finding, Cornett et al. (2008) even conclude that the notes to the accounts improve the firms´ corporate governance.

According to Ditter (2015), the notes to the accounts improve the communication between the stakeholders at the capital market. He analyzed the impact of the information provided by the notes on capital market transactions. The findings of Ditter (2015) show that transparency through the notes leads to higher efficiency on the capital market. His results draw also on the communication theory by concluding that the notes improve the information exchange between capital market participants. Further, the qualitative information through the notes to the accounts increases the credibility of the reported financial figures (Ditter, 2015). This can lead to several advantages for the firm, e.g. lower interest rates for loans (Bushman, 2014).

In result, the qualitative data provided by the notes are a beneficial information source for the users of the financial statements. This is especially true regarding the accounting policy and revenue recognition disclosures. The information in these sections of the notes is used by financial analysts to make their decisions (Lang and Lundholm, 1996). It improves the understanding concerning the firm`s business fundamentals. Barth et al. (2008) pointed out the importance of supplementing the reported figures with qualitative information by the notes to provide a fuller understanding of the firm's financial situation. It enables the external users to interpret the background of the reported figures. For instance, the information about accounting policy choices provide value insights regarding the firm`s business characteristics and its industry (Barth et al., 2008).

Furthermore, the financial notes present valuable information regarding the firm`s current and future earnings (FASB, 2012).

The study of Rowbottom and Lymer (2009) demonstrated that especially the group of nonprofessional investors focuses on qualitative data instead of the financial statements. Their results imply that the textual descriptions in the notes facilitate the interpretation of the financial reporting. Further, the research of Hodge et al. (2004) found out that there is a better understanding if qualitative information in the notes is hyperlinked to the reported figures in the financial statements.

With regard to the content of the notes, it has to be stated that the management rules about the exact information (section 302 of SOX). This means that the above outlined degree of transparency is an outcome of managers' decision. According to section 302 of SOX, the financial statements belong to the responsibility of the management. In particular, this provision requires the management to certify that the financial reports do not contain any misleading or untrue statements. According to Section 302 of SOX, the management is responsible for the correctness of financial statements. This means that they must take care that the financial statements are prepared according to the statutory requirements and the additional obligations of the firm`s articles of incorporation (Fan and Wong, 2002).

The figure below illustrates the financial reporting process. It becomes aware that the auditor is an external oversight body. Auditing has a monitoring function (Xie et al., 2003). However, the process of drawing up the financial statements belongs to the managers´ scope of responsibilities. This includes the disclosure of qualitative information by the notes.

Figure 4: The financial reporting process (Danjou, 2006)
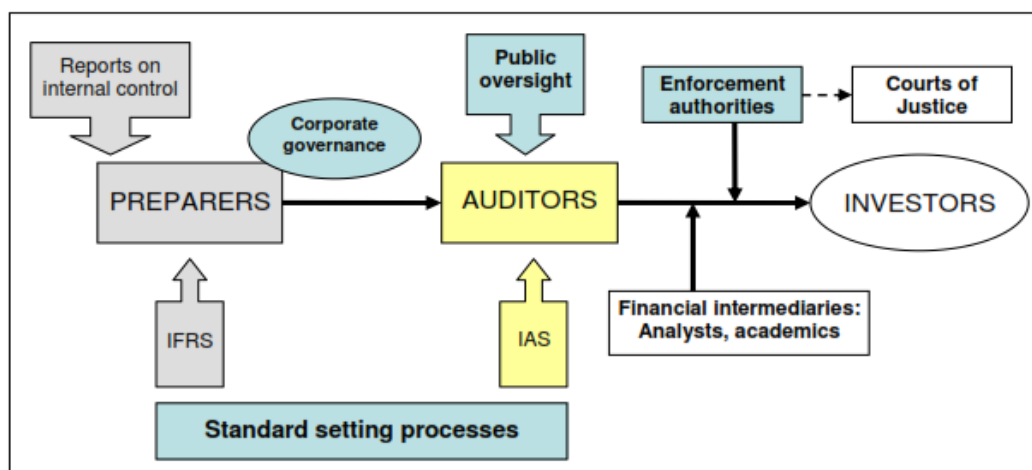
According to Chychyla and Kogan (2015), the development of electronical data submission changes the financial reporting process. In this context, the use of XBRL technology is of crucial importance. It allows the detail tagging of significant accounting information (Chychyla and Kogan, 2015). This enables the users of financial statements to search for certain income items, e.g. earnings management.

2.3.1 Disclosure Quality

There is another strand of research analyzing the qualitative aspect of the notes to the accounts. According to FASB (2012), there are quantitative and qualitative parts of the financial reporting. The balance sheet, the profit and loss account or the cash flow statement provide quantitative data. Standard setters have long stressed the importance of those quantitative parts of the financial reporting (IASB, 2010; FASB, 2010; FASB, 1980). It allows users of the financial statements to evaluate the financial situation of a firm according to the current accounting numbers. In addition, it is possible to gain further information by comparison with figures of previous fiscal periods (FASB, 2010). However, there is important information which is not shown on the face of the financial statements. This is the qualitative information provided through the notes to the accounts (FASB, 2012). That is the subject of the research in the field of disclosure quality. The notes content firm-specific information which improves the understanding of the current financial situation (Tucker, 2015). For instance, information about historical transactions influencing the current fiscal period of a firm.

The theoretical background of disclosure quality theory is based on the agency theory. Information asymmetries in the financial reporting are part of the relationship between the principals and agents. The principals have less accounting information than the agents (Huang and Zhang, 2012). Thus, the principals are not able to completely monitor the behaviour by the management. For instance, the principals need information to evaluate if the management influenced the earnings. Especially information about accounting policy choices are supposed to improve the understanding of a firm's current and future earnings (FASB, 2012). Thus, disclosure quality has a direct impact on the probability to detect earnings management. It positively influences the monitoring of those activities.

By following this line of reasoning, Tucker (2015) analyzed the utility of industry-specific accounting policies. His findings imply that the adoption of industry-specific

60

accounting policies improves the disclosure quality. The empirical results show that the notes of a firm are more similar with industry peers if industry-specific accounting policies are adopted. Further, Tucker (2015) found out that accounting policies against the industry practice are an essential tool to implement accrual-based earnings management. He concludes that industry-specific accounting policies can not only lead to more similar notes, but also reduce the opportunities to manipulate the earnings.

Moreover, previous literature examined the effect of disclosure quality on the work of financial analysts. According to Lang and Lundholm (1996), more informative disclosures are related to larger analyst following, less dispersion among analyst forecasts, and less volatility in forecast revisions. Their findings imply that financial analysts utilize the qualitative information of the notes more than other users of the financial statements. Thus, the forecast accuracy depends on the information of the notes. According to Lang and Lundholm (1996), an increased degree of transparency improves the work of financial analysts. Their results correspond with Bozanic and Thevenot (2015) who state that irrelevant information as well as overlaps and duplications must be avoided while significant items of the fiscal year should be highlighted by tabular presentations.

As outlined above, the development of electronical data submission steadily improves the financial reporting process. This is also true for the disclosure environment (Dhole et al., 2015; Felo et al., 2018). For instance, the use of cross references was revolutionized by hyperlinks. Further, innovative information technology, e.g. the use of XBRL standard in accounting, enables to analyze the notes without time-consuming document searching processes (Hoitash and Hoitash, 2018). The study of Dhole et al. (2015) demonstrated that detail-tagged XBRL notes of the SEC filings lead to more structured and comparable accounting information.

In comparison to the reported figures in the primary financial statements, the notes received less attention by the previous literature. This may be related to the fact that the notes are relatively more complicated to understand and compare than the quantitative information. The textual descriptions in the notes are more firm-specific. Therefore, detail-tagged XBRL filings are especially beneficial for this part of the financial reporting. It reduces the risk that important information is ignored by the external users since it is too difficult to comprehend.

There are several papers analyzing the relationship between opportunistic earnings manipulation and disclosure quality. According to Hirst and Hopkins (1998), the qualitative information through the notes improves the monitoring of earnings quality. Their findings imply that auditors and other oversight bodies gain useful indications regarding earnings management. For instance, revenue recognition disclosures contain information about a firm's future earnings. In essence, revenue recognition is a universal accounting issue (Peterson, 2012) and misreported revenues are one of the most common reasons for restatements (GAO, 2002; GAO, 2006).

In the same vein, the research of Lee et al. (2006) found out that there is a positive association between disclosure quality and earnings quality. According to their results, the qualitative information about accounting policy choices improves the understanding about a firm`s current and future earnings. For instance, accounting policy disclosures indicate whether a firm used accounting policies against the industry practice. If this would be the case, there is a higher probability for earnings management. In conclusion, more comprehensive and transparent notes can restrict the management from manipulating the earnings (Lee et al., 2006). This is due to the fact that more qualitative information is inversely related to opportunities of earnings management. Lee et al. (2006) explain that disclosure quality increases the effectiveness of scrutiny regarding earnings management. There is a higher risk for managers that those activities are detected in case of a transparent disclosure environment.

According to Huang and Zhang (2012), the qualitative information of the notes enhances the confidence of the users of financial statements. Their survey research found out that the explanatory power of the notes can increase the credibility of the financial reporting. This in turn leads to better decision bases from the user's perspective. As outlined by the study of Lee et al. (2006), disclosure quality reduces the management`s propensity to influence the earnings. In correspondence with the results of Huang and Zhang (2012), they found out that information asymmetries increase the opportunities for earnings management. In contrast, the qualitative information provided by the notes improves the possibilities to monitor the behaviour of the management. This can be especially beneficial with regard to the principal agent relationship between the management and the shareholders. While the monitoring of the agents normally causes substantial costs, the qualitative information issued by the notes offers an alternative at a cheaper cost (Kim et al., 2012). Therefore, disclosure quality can be regarded as a moni-

toring mechanism to mitigate agency costs between management and shareholders (Huang and Zhang, 2012).

In conclusion, the previous research in the field of disclosure quality states that the qualitative information provided by the notes increase the transparency in the financial reporting (FASB, 2012). It enables the users of financial statements to understand and compare the reported figures (Tucker, 2015). Further, it allows to evaluate the firm's current and future earnings (Lobo and Zhou, 2001). Therefore, disclosure quality has a positive impact on the monitoring of earnings management (McMullin, 2014).

2.3.2 Disclosure Complexity

Beside the literature about disclosure quality, there is another strand of research analyzing the complexity of disclosures. According to Hirshleifer and Teoh (2003), there is an inverse association between the volume of disclosures and the attention by the users of financial statements. Their results show that increasing complexity of the provided information impairs the user`s understanding. The signal effect of individual parts of the notes can be reduced by more complex notes. As outlined in the previous section, the notes provide information about accounting policy choices and revenue recognition. This information is of crucial importance for the monitoring of earnings management. Therefore, the phenomenon of disclosure complexity impairs the detection of earnings management (Hirshleifer and Teoh, 2003).

This is in line with the study of Peterson (2012) who found out that more complex disclosures increase the propensity to manage the earnings. His results show that an increasing level of complexity in the notes is beneficial for the implementation of earnings management. From the managers´ perspective, the complexity reduces the risk of scrutiny. Based on his findings, Peterson (2012) formulated the manipulation theory. According to this theory, managers opportunistically influence earnings when disclosures are more complex. This is due to the fact that disclosure complexity leads to decreasing transparency of accounting information (Peterson, 2012). There are less opportunities for the users of financial statements to monitor the behaviour of the management.

In correspondence with these findings, there are further studies that found evidence for the manipulation theory. The research of Hunton et al. (2006) examined this phenome-

non even before Peterson introduced the manipulation theory in the year 2012. According to the results of Hunton et al. (2006), there is a higher degree of real earnings management activities if the notes are complex. He focused on real cash flow elections by selling available-for-sale securities. The data sample of his experimental study included 61 US firms. In line with the manipulation theory, the findings of Hunton et al. (2006) show that managers tend to increase the volume of the notes if they aim to opportunistically influence the earnings.

In the same vein, Huang and Zhang (2012) found out that there is a positive association between disclosure complexity and agency costs. Their survey research showed that more complex notes lead to decreasing usefulness of the provided information. The results imply that the users of the financial statements find it difficult to recognize which information is significant in case of complex disclosures. In conclusion, Huang and Zhang (2012) state that more complex notes cause information asymmetries in the financial reporting. The principals have less information to monitor the behaviour of the agents. As a consequence, there is a higher probability for the management to influence the earnings without scrutiny.

In line with the findings of Huang and Zhang (2012), the study of Zeff (2007) implies that disclosure complexity leads to decreasing efficiency of monitoring regarding earnings management. According to Zeff (2007), complexity impairs the use of the notes as a monitoring mechanism. He concludes that complex notes are not appropriate in order to restrict the management from manipulating the earnings. Instead, his results show that alternative monitoring tools are required in case of disclosure complexity. As outlined above, the notes to the accounts enable principals to evaluate the earnings quality at a cheaper cost compared to other monitoring tools. In result, Zeff (2007) states that the phenomenon of disclosure complexity leads to increasing principal-agency problems. There can occur financial drawbacks through the requirement of costly monitoring methods.

In order to ensure the explanatory power of the notes, the content should be limited to meaningful and relevant information. According to Garrett et al. (2014), this kind of information is also known as material. They state that an item is qualified as material if it has the potential to change a decision of a shareholder or an investor. For instance, information that relates to future cash flows from an equity investment or loan is always material from an investor`s point of view.

Furthermore, the view of the US Supreme Court should be taken into account in order to assess which information is material. According to an important ruling of the US Supreme Court, information is material if "[...] the disclosure of the omitted fact would have been viewed by the reasonable investor as having significantly altered the total mix of information made available." In contrast, the Court qualifies a fact as immaterial if investors regard that as purely 'informative', because "[...] management`s fear of exposing itself to substantial liability may cause it simply to bury the shareholders in an avalanche of trivial information - a result that is hardly conducive to informed decision making." (TSC Industries, Inc. v. Northway, Inc., 426 U.S., p. 438, 429-450, 1976).

In addition to the early but still valid definition of the term 'materiality' by the US Supreme Court, it has to be taken into account that the total information provides a true and fair view of the firm`s financial situation (SEC, 2009). This means that not only the individual items have to be evaluated, but also the complete information disclosed by the notes. By following the SEC's view (2009), the decision about meaningful and relevant information in the notes requires consideration of the firm`s industry and individual financial situation.

According to Hopwood et al. (2011), disclosure complexity is an important policy issue for the legislator and accounting standard setters. As described above, the financial notes can provide qualitative information regarding the firm`s current and future earnings. It is an important part of the financial reporting. The importance of this issue is also shown by the extensive literature in this field. There are several researchers who complain about the steadily increasing number of disclosures (e.g. Ryan, 2012; Peterson, 2012; White, 2013). The high volume of disclosures leads to complexity and information overload instead of more clearness (Ryan, 2012).

Moreover, disclosure complexity is a concern that occupies the SEC. The former chair of SEC stated that "when disclosure gets to be too much or strays from its core purpose, it could lead to what some have called information overload - a phenomenon in which ever-increasing amounts of disclosure make it difficult for an investor to wade through the volume of information she receives to ferret out the information that is most relevant." (White, 2013, p. 27). According to the SEC (2009), the qualitative information in the notes improves the comparability of reported figures. The notes to the accounts enable users of financial statements to assess the financial situation of the firm relative to

industry peers. Further, the earnings quality of different firms can be compared. However, the degree of comparison is impaired in case of disclosure complexity.

In summary, it became aware that the notes to the accounts are a key part of the financial reporting. They provide information about accounting policy choices and revenue recognition. This is of crucial importance to assess the earnings quality and detect earnings manipulations. Disclosure complexity leads to a decreasing effectiveness of this monitoring mechanism.

2.3.3 The Role of the Notes to the Accounts in Communication Theory

There is a strand of research analyzing the relationship between the notes to the accounts and the communication theory. In general, the communication theory states that it is essential to share information (Griffin et al., 2014). According to the research of Griffin et al. (2014), the exchange of information positively influences different areas of life. For instance, effective information flows improve working conditions. The communication behaviour plays a key role in a functioning cooperation between people (Griffin et al., 2014).

According to Shroff et al. (2014), the exchange of information belongs to several processes within a firm. Their findings imply that the effective communication between a firm and its stakeholders is a criterion of success. Therefore, it is important for firms to provide decision-relevant information through appropriate channels. In this context, the results of Shroff et al. (2014) show that the notes to the accounts have a supportive effect on the firm`s information policy. Overall, the qualitative information provided by the notes can improve the communication between a firm and its stakeholders.

In the same vein, Ditter (2015) analyzed the process of information exchange between the firm and the capital market participants. He found out that the financial statements are the most important information source for the capital market participants. This is due to the fact that the capital market participants have normally neither personal meetings nor opportunities to ask individual questions. According to Ditter (2015), the notes improve the understanding of the users of financial statements. By drawing on the communication theory, his findings show that the notes provide information about the firm`s current financial situation. In conclusion, Ditter (2015) states that the explanatory power of the notes can increases the credibility of the reported financial figures.

In correspondence with the research of Ditter (2015), Marshall and Weetman (2007) state that that transparency in the financial reporting improves communication between the firm and its stakeholders. They examined the relationship between the cost of communication for the firm and the use of provided information from the users´ perspective. Their findings imply that the qualitative information through the notes is especially beneficial for the external users. Furthermore, the firm can exchange information at a cheaper cost compared to other possible ways, e.g. personal meeting or individual letters.

By following the research results above, the FASB (2012) conclude that a higher degree of transparency in the financial statements positively influences the communication between a firm and its stakeholders. The increased transparency enhances the confidence of the users of financial statements (FASB, 2012). In addition, more transparent financial statements lead to better decision bases from the user's perspective according to Chen et al. (2017).

As already outlined above the information exchange in the course of the financial reporting is based on the communication theory (Furnas et al., 1987). The early research of Lasswell (1948) classified the communication theory into four key elements/questions:

(5) Who is involved by the communication?

(6) What is the information content?

(7) Which information channel is used?

(8) What possible impacts are caused by the communication?

With regard to the case of the notes to the accounts, there are the following answers regarding the above mentioned key questions:

(1) The managers provide information to the users of the financial statements.

(2) The notes to the accounts provide qualitative information, which is otherwise presented on the face of the primary financial statements.

(3) The notes to the accounts are filed with the SEC through the EDGAR system.

(4) The information provided by the notes to the accounts is taken into account during decision-making processes.

According to the early findings of Shannon and Weaver (1948), there are three issues which might influence the significance of the communication theory. First, there could occur technical problems. Second, semantic problems might change the intended meaning. Third, the accuracy of information might be influenced through effectiveness problems. The obligation to file the notes to the accounts to the EDGAR system is observed by the SEC (2009). If a firm does not submit the notes to the accounts because of technical problems, the SEC will remind or even penalize this firm to get the financial statement information (SEC, 2009). Thus, there is no significant risk regarding technical issues which might influence the communication. Further, there is a specific vocabulary in the field of accounting (Furnas et al., 1987). This minimizes the probability of semantic problems. However, earnings management might cause effectiveness problems regarding the provided information. In general, the level of transparency decreases if firms implement earnings management activities (FASB, 2012). Transparency is a key element of the notes to the accounts. Previous research found out that an increased level of transparency in the notes leads to higher reliability of the accounting information (Hunton et al., 2006; Marshall and Weetman, 2007). In result, earnings management activities affect the effectiveness of communication. Since the notes contain qualitative information, which is otherwise not presented on the face of the primary financial statements, recipients rely on this information source (FASB, 2012). Effectiveness problems could lead to wrong or negative decisions of the users of the financial statements (Garrett et al., 2014).

In conclusion, it became aware that the qualitative accounting information in the notes improves the communication between a firm and its stakeholders. It enables the users of the financial statements to understand a firm`s financial situation. Thus, the notes to the accounts can reduce information asymmetries between the principals and the agents. The explanatory power of the notes increases the transparency of the financial statements. By drawing on the communication theory, previous research found out that more transparent information environment is beneficial for the firm itself and its stakeholders (Zeff, 2007).

Moreover, the review of the literature about communication theory showed that the notes provide an information source at low costs for the users of financial statements. Transparent information by the notes improves the communication with capital market participants. Previous research found out that an increased degree of transparency leads to incentives, such as enhancement of investor confidence (Ryan, 2007). This in turn can improve the allocation of capital for the firm.

2.3.4 Similarity of the Notes to the Accounts

The previous literature in the field of disclosure quality showed that the information provided by the notes is useful in order to evaluate the earnings quality (Chen et al., 2015). Especially, the information about accounting policy choices and revenue recognition allows monitoring of earnings management (Tucker, 2015). The review of the literature about disclosure quality showed that the notes have a positive effect on the restriction of earnings manipulations (Lee et al., 2006). In addition, the previous literature found out that firms which are subject to the same economic events and circumstances, should disclose similar information in their notes (Peterson et al., 2015). Therefore, the similarity of the notes to the accounts shows how accurate firms provide information to the users of the financial statements. According to the FASB (2008, p. 3) the qualitative "[i]nformation about a particular enterprise gains greatly in usefulness if it can be compared with similar information about other enterprises."

By following the research results above, the textual similarity of the notes should be considered as an additional aspect of disclosure quality. For this purpose, it is essential to find out what factors determine similarity of the notes. The previous research in this field has shown thus far that accounting policy notes are more similar within the same industry than across industries (Peterson et al., 2015). Firms within the same industry are more comparable in their business characteristics and their economic environment according to Peterson et al. (2015). This is in line with the above mentioned theory, since firms should translate the same economic events into similar qualitative accounting information through their notes.

Further, the research of McMullin (2014) examined the association between firm-pair similarity of the notes and accounting comparability. His findings imply that more comparable financial figures reported in the balance sheet or profit and loss accounts are related to textual similarity of the notes. Therefore, McMullin (2014) concludes that

financial statement comparability positively influences the similarity of the notes. By drawing on the findings of Peterson et al. (2015), McMullin (2014) finds that financial statement comparability is higher amongst firms within the same industry. However, neither the study of Peterson et al. (2015) nor the paper of McMullin (2014) give insight on within-industry variations of the notes to the accounts.

In addition, there are further business characteristics of a firm that might explain similarity of the notes. According to Dechow and Dichev (2002), cash flow volatility and sales volatility have a negative impact on the textual similarity of the notes. Their results point out that high cash flow and sales volatility indicates a volatile environment, where firms are more likely to use approximations in their financial statements. This in turn increases the probability of estimation errors. In contrast, the findings of Dechow and Dichev (2002) show that the financial reporting of low-volatility firms' are relatively consistent over time. This can result in more similar notes to the accounts. Hence, there is a negative relation between higher cash flow or sales volatility and similarity of the notes to the accounts.

Moreover, Dechow and Dichev (2002) examined the impact of cash-to-cash cycles on the similarity of the notes. Their empirical research measured the length of the cash-to-cash cycle in days. The exact calculation included the sum of days sales outstanding plus days inventory outstanding minus days payable outstanding. Hereby, it is a big advantage of the cash-to-cash cycle that it additionally addresses the ability of a firm to repay its credit. Dechow and Dichev (2002) found out that a short cash-to-cash cycle leads to better accessibility to cash in the short run. Further, it should represent more effective working capital management of a firm. Therefore, Dechow and Dichev (2002) conclude that short cash-to-cash cycles are related with a stable economic situation of the firm. This in turn has a positive impact on the similarity of the notes. In summary, Dechow and Dichev (2002) expects a positive correlation between shorter cash-to-cash cycles and more similar notes.

According to the research of De Franco et al. (2011), there is a relationship between the valuation of a firm and the similarity of the notes. The findings of their empirical research show that under- or overvaluation of the market price influences the comparability of financial reporting. This includes the qualitative information provided by the notes. Therefore, the study of De Franco et al. (2011) indicates that price-sales multiple can be used to explain similarity of the notes. The market value of a firm is based on

price multiples within the scope of the research of De Franco et al. (2011). In particular, they calculated the price-sales multiple as the natural log of a firm's market cap to sales revenue of the current fiscal year. The results of De Franco et al. (2011) show differences in qualitative notes issued by firms that are either being under- or overvalued. The financial statements of those firms might be less reliable due to pressure by the expectations of capital market participants. According to De Franco et al. (2011), under- or overvalued firms are expected to aim certain reporting goals. Therefore, those firms should contain less similar notes to the accounts.

Previous research also analyzed the influence of firm size on the quality of a firm's accounting information. Peterson et al. (2015) found out that smaller firms should change their accounting policies or revenue recognition disclosures more frequently. They explain that these changes come along with operational changes. According to Peterson et al. (2015), operational changes take place more often in smaller firms than in bigger ones. Therefore, the business environment and the accounting principles of bigger firms should remain relatively unchanged over time. This in turn leads to more consistent and similar accounting policy disclosures compared to peers. As opposed to the results of Peterson et al. (2015), the study of McMullin (2014) complains that bigger firms are more likely use specific words in their notes. Hence, he states that bigger firms might have a lower degree of textual similarity. Overall, it is expected that there is a positive association between firm size and textual similarity of the notes. This is in line with the Cohen and Zarowin (2010) who found out that bigger firms employ more qualified accountants. They measured firm size by calculating the natural log of market value of equity. Their results indicate that better knowledge and financial expertise are positively related to similarity of the notes.

Moreover, there are several studies focusing on the relationship between auditing and the similarity of the notes. The research of McMullin (2014) provides evidence that firms that share the same auditor have a higher degree of similarity in their notes to the accounts. This implies that firms sharing the same auditor get similar advice regarding the preparation of their notes. In the same vein, Dunn and Mayhew (2004) examined the notes of clients of industry-specialist auditors. Their findings show that those firms have an overall better disclosure quality and more similar notes. In particular, experienced auditors with knowledge spillovers from other audits in the same industry should have a holistic view of a firm's accounting (Zhang, 2012). This in turn improves the financial

reporting. In correspondence with these results, Tucker (2015) state that industry-specialist auditors can ensure the adoption of industry-specific accounting policies. As already outlined in section 2.3.1, industry-specific accounting policies increase the comparability of financial statements. This includes the qualitative information in the notes.

In line with the above discussed studies, Healy and Palepu (2001) state that there is a positive impact of high-quality audits on the textual similarity of the notes. In order to measure the audit quality, the auditor size was adopted as a proxy. Their research examined the notes to the accounts of firms that are subject to high-quality audits. The results show that those firms should find it difficult to alter accounting policies against industry practices. Further, Healy and Palepu (2001) conclude that if auditing and accounting regulations worked perfectly, firms would only change accounting policies in cases, where they adopt new business models. In an imperfect setting, they argue, managers could make accounting decisions and disclosures in order to manage reported performance. Thus, high-quality audits may lead to consistent and similar notes to the accounts compared to peer firms.

In summary, theory and empirical findings suggest that auditors positively influence the preparation of the notes to the accounts. This is despite the fact that it should actually be managers' sole responsibility (Garrett et al., 2014). The previous research showed that auditors can improve disclosure quality and increase the comparability of qualitative information. Therefore, it is expected that firms sharing the same auditor or subject to high-quality audits have more similar notes to the accounts.

In addition, there are several researchers focusing on the relationship between disclosure complexity and textual similarity of the notes (e.g. Loughran and McDonald, 2016; Lang and Stice-Lawrence, 2015). They analyzed whether the length of disclosures have an impact on the textual similarity of the notes. By following Peterson (2008), both abnormally high and low levels of disclosure should represent uncertainty about accounting information. His results show that abnormal disclosure length can impair the explanatory power by the notes. Peterson (2008) measures abnormal levels of accounting policy disclosure length cross-sectionally. In particular, he regresses the disclosure length on many different independent variables. Therefore, previous research argues that this measurement includes too many different factors, which might lead to uncertainties regarding the results (Dichev and Li, 2013). In order to avoid this shortcoming,

the log number of words was introduced by Peterson (2008) and Li (2008) as appropriate measure. Independent of the question how to calculate the disclosure length, it became apparent that abnormal disclosure length negatively influences the similarity of the notes.

Furthermore, there are studies analyzing the impact of financial ratios on the similarity of the notes. According to Gunny (2010), financial ratios allow to measure economic comparability. The findings of Dichev and Li (2013) imply that economic comparability positively influence the similarity of the notes. Therefore, their results suggest that financial characteristics such as return on assets, a firm's leverage, capital intensity, book-to-market ratio and sales growth can be used to explain the similarity of the notes. For example, Peterson et al. (2015) found out that firms with lower growth are supposed to be more conservative and consistent in their financial statements. This includes the notes to the accounts. In line with these results, Dichev and Li (2013) argue that growth firms have the capability to use aggressive and income-increasing accounting choices. Further, the study of Collins et al. (2017) points out that growth firms might also have some incentives such as raising external capital. They argue that this should be translated into less similar notes. In conclusion, the previous research implies that low growth firms, thus firms with higher book-to-market ratios, should contain more similar notes.

In the same vein, firms with higher capital intensity as measured by net property plant and equipment to total assets are supposed to contain higher magnitudes of total accruals through depreciations and impairment of fixed assets (Dichev and Li, 2013). As a consequence, these firms have to explain more accounting issues in their notes. This in turn leads to differences in the textual information provided by the notes. Due to this fact, Dichev and Li (2013) conclude that those firms have less similar notes compared to peers. Further, they also found evidence for a negative impact of the amount of return on assets and a firm's leverage on the comparability of financial statements. Similar to the characteristics of growth firms, there is a higher probability of income-increasing accounting choices amongst firms with a high return on assets or leverage. The research results show that those firms are less consistent in their financial statements (Dichev and Li, 2013). This is also confirmed by the findings of Anagnostopoulou and Tsekrekos (2017). Hence, it can be stated that the return on assets and a firm's leverage negatively influence the similarity of the notes.

In summary, the previous research has shown thus far that several factors can determine the textual similarity of the notes. Moreover, it was shown that the notes to the accounts are more similar within the same industry than across industries (Peterson et al., 2015). Overall, it can be concluded that similarity of the notes is related to factors that capture economic comparability.

2.4 XBRL Standard in Accounting

XBRL is a financial reporting markup language derived from XML (Plumlee and Plumlee, 2008). There is a growing number of XBRL-formatted data in different areas of research. This section reviews the existing literature about development of XBRL technology in the financial reporting. It aims to point out the individual stages during the implementation of XBRL format in accounting. Especially the introduction of XBRL standard for filings of financial statements with the SEC is reviewed in the following.

There are several studies about the advantages and disadvantages of XBRL-formatted data. According to Chychyla and Kogan (2015), it is advantageous that it is machine-readable. This allows analyzing accounting data in a more efficient way. Big data can be analyzed in a standardized manner (Rezaee et al., 2018). XBRL provides an effective data format which is appropriate "[t]he comparison of financial and business performance across companie[s]" according to the SEC (2009, p.8).

In line with these result, Plumlee and Plumlee (2008) find that retrieving XBRL-formatted data is less erroneous than searching for each note component with software. Their study demonstrates that the use of XBRL reduces the risk of biased data. This in turn can lead to more reliable research results. The study of Taylor and Dzuranin (2010) points out another advantage beside the reduced probability of errors. This the time factor. They state that machine-readable XBRL format enables researchers to analyze massive accounting data without time-consuming document searching processes and case-by-case decisions. Further, the manual collection and transfer of underlying data is not required (Taylor and Dzuranin, 2010). Overall, XBRL leads to a reduction of the processing time for users.

The XBRL data can be shared between different platforms according to Blankespoor (2016). The users of the financial statements can easily access the data since it is compatible with different application programs. According to Fang (2009), XBRL allows

also to non-sophisticated users to gain information about the firm's financial situation. Hence, it increases the usability of the accounting information.

Moreover, the research of Efendi et al. (2011) analyzed the impact of XBRL technology on the information processing costs. Their results show that XBRL-formatted data allows exchanging information at a cheaper cost compared to other data formats (Blankespoor, 2016). This is in line with Yen and Wang (2015) who find that XBRL increase the market efficiency. In fact, it is possible to retrieve and process XBRL-formatted data with cost effective software tools, e.g. Python or MS Excel.

Since XBRL technology is fairly new in accounting research, there are studies complaining about the time-series availability. For instance, Hoitash et al. (2018, p. 7) state that "[d]espite being limited by the relatively shorter time series, our results demonstrate that XBRL is a promising technolog[y]". However, it can be observed that the availability of accounting data in XBRL format constantly improved over the previous years (Zhang, 2018). Therefore, this limitation will be mitigated and finally disappear in future.

There is another strand of research analyzing the association between XBRL technology and information asymmetries in the financial statements. According to Pinsker and Li (2008), XBRL-formatted financial statements can reduce information asymmetries. Their results show that the detailed XBRL taxonomy causes more transparency in the financial reporting. In correspondence with that Hodge et al. (2004) find that standardization of XBRL format causes increased transparency for the users of financial statements. In the same vein, Bergeron (2003) points out that the format consistency through XBRL facilitates the information processing for users of financial statements. Further, his results show that XBRL improves the information accuracy. In line with these findings, previous research states that incompatible data formats cause information asymmetries in the financial reporting (XBRL International, 2007). Overall, the use of XBRL improves the information environment of financial reporting.

Beside the aspect of reduced information asymmetries, there are researchers who analyzed the influence of XBRL adoption on earnings manipulation and detection of those activities. McNamar (2003) states that the SEC staff would have reviewed the cash flow from operations filed by Enron if XBRL was the mandatory standard at this time. He argues that revenues, profits and cash from operations reported in XBRL format can be

easily compared against industry standards. This would have enabled the SEC staff to identify abnormal growth rate of Enron's cash flows from operations. As a result, McNamar (2003) concludes that XBRL reduces uncertainty of financial information. The standardization by detailed XBRL taxonomy enhances the confidence by users of financial statements (Scherr and Ditter, 2017).

In line with these findings, previous research examined the impact of XBRL on the monitoring of earnings management. According to Commerford et al. (2016), the increased level of transparency through XBRL-tagged financial statements improves the effectiveness of monitoring. A higher degree of standardization and transparency enables users to better compare financial statements across different firms and over time (Scherr and Ditter, 2017). This in turn increases the probability to detect earnings management activities. Therefore, the use of XBRL positively influences the effectiveness of monitoring.

By following the above outlined research results, the previous research examined whether XBRL can restrict earnings management activities. The study of Dichev and Skinner (2002) demonstrates that the use of XBRL reduces the mangers' propensity to manipulate the earnings. Their results imply that the increased transparency through XBRL-formatted data enables external auditors to scrutinize earnings management activities. This is in line with the research of Boritz and No (2016) who state that XBRL-tagged data increases the probability to detect earnings management. Their results show that the increased level of comparability of financial information causes effective restriction of earnings management. In the same vein, Li et al. (2012) points out the important disciplinary role of XBRL-tagged data in financial reporting. They state that the increased transparency through mandatory XBRL filings discourages managers from opportunistically influencing the earnings upwards or downwards. This is due to the fact that the managers are aware of the improved monitoring through increased transparency (Li et al., 2012). The increased transparency provided by XBRL technology especially increases the cost to implement accrual-based earnings management activities without scrutiny (Blankespoor et al., 2014). Consequently, it is observable the extent of accrual-based earnings management decreased subsequent to the mandatory XBRL adoption (Dhole et al., 2015).

The research of Bartley et al. (2010) examined the XBRL conversion for filings with the SEC. According to their comprehensive analysis, the implementation of XBRL standard

is already far advanced in the US. Compared to other countries, the SEC early realized the utility of this technology. The introduction of XBRL began with a voluntary program in the year 2004. After this test phase was successfully completed, the SEC approved the rule regarding the mandatory XBRL conversion in the financial statements on December 17, 2008 (SEC, 2009). The title of this rule is "Interactive Data to Improve Financial Reporting" (SEC, 2009). It requires a phased implementation of XBRL standard for electronic submission of annual financial statements of firms using U.S. GAAP. In particular, it is not relevant if it is a domestic or foreign company. The mandatory XBRL conversion has been phased into a period of three years beginning in 2009. These three steps are outlined in the following table:

- Phase 1 filers: Domestic and foreign large accelerated filers using U.S. GAAP (e.g., firms with worldwide public common equity float above $5 billion) are subject to XBRL reporting for quarterly reports on Form 10-Q or annual reporting Forms 10-K, 20-F or 40-F for all fiscal periods ending on or after June 15, 2009.

- Phase 2 filers: All other large accelerated filers (e.g., firms with public common equity float between $750 million and §5 billion) are requested to use XBRL reporting for fiscal periods ending on or after June 15, 2010.

- Phase 3 filers: Finally, all remaining filers are required to use XBRL in their financial reporting for fiscal periods on or after June 15, 2011.

In addition to the above outlined development of electronic filings, the SEC ruled another important XBRL conversion. This relates to firms with a certain SEC filings status, namely the large accelerated firms (Section 240 Rule 12b-2 of Exchange Act). Since the year 2009, those firms are obligated to tag their notes to the accounts as a block of text in XBRL (SEC, 2009). Hence, the accounting policy disclosures are available from 2009 in XBRL format. However, in order to take this step the SEC had to modernize its filing system, the EDGAR database. It is worth mentioning that the SEC funded an amount of 54 million US-dollar to modernize the EDGAR system with XBRL technology (Gray and Miller, 2009).

With regard to the information content of the notes to the accounts, the SEC took another important step. It required publicly listed firms to detail tag tables, explanations of reported figures and significant accounting policies in the second year of their respec-

tive XBRL adoption (SEC, 2009). Compared to a simple block of text, this offers new opportunities regarding the analysis of the notes to the accounts (Felo et al., 2018). In particular, the XBRL-tagged notes enable researchers to obtain qualitative accounting information about specific parts of the notes according to Felo et al. (2018). For instance, information about unrecognized tax benefits or revenue recognition (Gleason et al., 2017). Those particular parts of the notes could have slightly different properties regarding disclosure and earnings quality. By comparing these different parts of the notes both cross-sectionally and in the time-series, researchers can gain information about mangers` accounting choices and the firm's current financial situation.

Despite the fact that a significant number of studies discussed the utility of XBRL standard in accounting, there is only little research about the differences between simple block-tagged notes and detail tagged notes (Felo et al., 2018). According to Arnold et al. (2012), information is more useful if it is tagged. Their findings show that it is easier to search for a particular item within the notes. In conclusion, the information by the notes is more accessible and comparable if it is tagged (SEC, 2009). In this context, detailed-tagging of information is even more important for the notes than the quantitative information. Previous research demonstrated that the notes tend to be relatively more complicated to understand and compare than the figures in the financial reporting. This is due to the fact that information provided by the notes is more firm-specific. The detail-tagged XBRL filings reduce the risk that important information is ignored by the external users since it is too difficult to comprehend.

The total number of tags in the notes soared through the requirement to submit detail-tagged XBRL notes (Felo et al., 2018). The XBRL taxonomy issued by the SEC offers roughly 13,000 standardized XBRL elements. If there is no standardized tag for a certain accounting issue, the firm is permitted to use customized extension elements (SEC, 2009). Although customized extension elements increase the reporting flexibility, the degree of comparability is reduced (XBRL.US., 2009). This is due to the fact that those extension elements are firm-specific (Li and Nwaeze, 2015). In contrast, standardized XBRL tags increase the transparency of the notes. Further, Li and Nwaeze (2018) found during a later research that the use of extension elements negatively influences forecast accuracy by analysts. In conclusion, the utility of notes in XBRL format increases with number of standardized XBRL elements.

The XBRL-formatted financial statements on SEC EDGAR database are categorized according to the firm's industry. The SEC filing system specifies the particular industry of a firm according to a two-digit SIC code. This categorization enables users to focus on financial statements of a particular industry. Hence, the industry-specific SIC code offers better opportunities for comparison of financial information. With regard to the research field of accounting and finance, it allows to analyze the within-industry similarity and to compare financial statements across certain industries. In conclusion, the SIC code offers opportunities regarding analysis of certain industries in a standardized manner.

Overall, the use of XBRL technology could lead to important advantages for both, the preparers and users of financial statements (Alles and Piechocki, 2012). With regard to the research field of accounting and finance, the constantly increasing amount of available XBRL-tagged documents provides a valuable data source. In contrast to other data sources, e.g. Compustat, the XBRL-formatted financial statements are truly presented "as reported". That means data is not aggregated, but presented as the firm originally filed it with the SEC. According to Hoitash et al. (2018), subjective aggregation is associated with the risk of biased information or a lack of information. Hence, the use of XBRL can ensure reliable research results.

2.5 Accounting Comparability Research

The following section reviews the existing literature in the field of accounting comparability. The subject of this strand of research is the analysis of the consistency of financial reporting within the firm`s business environment (De Franco et al., 2011). In particular, it is determined to which extent the provided information can be compared by the users of the financial statements. Prior studies showed that this area of research can have implications regarding the earnings quality and the comparability of qualitative information issued by the notes (Barth et al., 2012; Kim et al., 2013; Peterson et al., 2015).

Accounting comparability is of crucial importance for accounting regulators, e.g. the IASB and the FASB. Especially with regard to the debate about international harmonization of accounting principles, it is regularly referred to the utility of accounting comparability. According to Gross and Perotti (2017), accounting comparability must be distinguished from economic comparability. An example for economic comparability is

the extent to which the cash flows across different firms change in case of certain economic events. Economic comparability analyzes the similarity of economic parameters according to Imhof et al. (2017). It measures the reaction of the financial ratios on economic trends or changes. In contrast, accounting comparability focuses on the financial statement comparability both cross-sectionally and in the time series (Zhang, 2018).

Standard setters and accounting regulators have long stressed the importance of financial statement comparability as one of the key qualitative characteristics that enables users to evaluate earnings and the financial situation of firms (IASB, 2010; FASB, 2010). According to the FASB (2010, p. 19), "A comparison requires at least two items." That means that a particular line item must appear twice. Once on the firm`s financial statements and a second time on the financial statements of a peer firm. Otherwise, users of the financial statements cannot compare the two firms. Such lack of financial statement comparability normally occurs if firms have different underlying business models and thus, different transactions. However, it can also arise if a firm implement earnings management (Peterson et al., 2015).

By following the results above, the degree of comparability can be regarded as an enhancing characteristic of the firm's financial reporting. According to the FASB (2010), comparability facilitates the identification of similarities and differences of financial information across firms. Further, it enables the users of financial statements to evaluate the accounting consistency of firms over time.

The study of De Franco et al. (2011) is an important contribution in the field of accounting comparability. Their research states firms within the same industry possess similar accounting due to their exposure to a same set of economic events. According to De Franco et al. (2011, p. 899), "[t]wo firms have comparable accounting systems if, for a given set of economic events, they produce similar financial statements." They assume that firms in the same industry are subject to similar risks, growth perspectives, and eventually similar accruals and cash flows. This in turn should lead to more comparable financial statements.

The study of De Franco et al. (2011) made a major contribution to the accounting comparability research. It introduced an accounting comparability measure that enables to operationalize accounting comparability. In particular, they base their comparability measure on the mapping between earnings and stock returns across different firms with-

in the same industry. De Franco et al. (2011) used returns as a proxy for economic events and earnings as a proxy for financial statement output. Hence, it is an output-based accounting comparability indicator. Their comparability measure is positively related to analysts following and forecast accuracy. This confirms that comparability improves the quality of provided information by the financial statements.

Following the research of De Franco et al. (2011), comparability of accounting information and its merits have been subject to a stream of contemporary research papers. According to the study of Kim et al. (2016), the expected crash risk decreases if the financial statements are more comparable with industry peers. Further, Imhof et al. (2017) found out that there is an inverse association between the cost of equity and accounting comparability. Thus, there are lower costs of equity for a firm if the accounting information is more comparable. In the same vein, Fang et al. (2016) point out that higher accounting comparability reduces private loan interest spread. The study of Zhang (2018) analyzes the relationship between audit fees and the degree of accounting comparability. He concludes that accounting comparability has a positive impact on the amount of audit fees and thus, reduces the firm's costs.

The study of Bradshaw et al. (2009) outlined the relationship between accounting comparability and the effectiveness of financial analysts' forecasts. They found out that financial statement comparability is related to higher forecast accuracy. This is due to the fact that consistency of accounting information leads to more reliable data for financial analysts as outlined by Bozanic and Thevenot (2015). In line with those results, Kim et al. (2013) state that financial statement comparability reduces the firms' costs of debt capital. Their study examined the impact of accounting comparability from the perspective of the credit market. Kim et al. (2013) explain that financial statement comparability increases the transparency of information environment. This in turn causes a positive liquidity effect through the reduction of the cost of debt.

Moreover, Barth et al. (2012) focused on the accounting comparability across countries. In particular, they compared IFRS-based and US GAAP-based financial statements with regard to harmonization of accounting principles. Their results imply that accounting comparability is especially useful for internationally active investors. Further, McMullin (2014) finds that high-quality auditing is positively associated with accounting comparability. By following the previous research, he utilized auditor size as a proxy to measure the audit quality. The results of McMullin (2014) show that high-quality audits

cause more consistent accounting policy choices. This in turn increases accounting comparability.

In correspondence with the study of McMullin (2014), previous research found out that heterogeneity in accounting policy choices reduces financial statement comparability (DeFond and Hung, 2003). More flexible accounting opportunities impair the comparability of financial statements. In contrast, the adoption of industry-specific accounting policy choices improves the transparency of information environment according to De-Fond and Hung (2003). Previous research showed that high-quality auditors or industry-specific specialist auditors can increase the probability that firms use industry-specific accounting policy choices. Thus, the reviewed literature suggests that there is an overall positive impact of auditing on accounting comparability.

The literature in the field of accounting comparability spent only little attention to earnings quality. For instance, Sohn (2011) examines the effect of accounting comparability on both, accrual-based as well as real earnings management. His findings show that accrual-based earnings management decrease and real earnings management increase with financial statement comparability. This is due to the fact that firms use both variants as substitutes (Sohn, 2011). If the accounting is more consistent and comparable, firms will prefer real cash flow elections. In a later study, Peterson et al. (2015) found similar evidence. Their findings confirm that accounting comparability leads to transparency for the users of financial statements. This in turn allows better monitoring of earnings quality. Therefore, Sohn (2011) and Peterson et al. (2015) concludes that accounting comparability reduces the propensity for accrual-based earnings management.

Moreover, the study of Peterson et al. (2015) argues that previous empirical research did not consider the influence of consistent accounting policy choices on the earnings quality. They find that differences in accounting outputs can be related to inconsistent accounting policy choices. Peterson et al. (2015) draw on the findings of a survey research amongst CFOs undertaken by Dichev et al. (2013). According to their results, 94 percent of the participating CFOs state that consistent accounting policy choices are positively related with earnings quality.

In summary, there is a growing number of studies about accounting comparability. The majority of researchers apply a comparability indicator, which is derived from an earnings response coefficient framework as developed by De Franco et al. (2011). The out-

put-based measure compares accountings systems between reporting entities that have similar transactions. As outlined above, this measure is based on earnings itself. Due to this fact, critical voices in literature arguing that an input-based accounting comparability measure should be more appropriate to analyse the earnings quality (Fang et al., 2016; Gross and Perotti, 2017). In addition, there are even researchers stating that "[u]sing both input- and output-based comparability helps attain a fuller understandin[g]" (Hoitash et al., 2018, p. 8). The research of Hoitash et al. (2018) showed that there is a complementing character between input- and output-based comparability. Previous research did not consider the multi-dimensional structure of comparability. Therefore, similarities in accounting inputs, such as accounting policies must be considered as an additional proxy for accounting comparability.

In conclusion, the review of the literature in the field of accounting comparability showed that it is a key issue for accounting regulators and users of financial statements. It became apparent that financial statement comparability increases the transparency of the information environment. Despite the fact that there is extensive literature about the properties and benefits of accounting comparability, the previous research did not examine the utility of textual similarity of the notes.

2.6 Summary and conclusions

This chapter has highlighted the significant issue of earnings management and the importance of qualitative accounting information through the notes. In particular, it presented an introduction and the theoretical background of earnings management. This includes definitions and perspectives and techniques of earnings management. In addition, it reviews the previous empirical studies about measurement of earnings management. Also, this chapter discusses the motives for earnings management activities. A critical understanding of the motives is required in order to restrict the management from influencing the earnings. In this context, the previous research addresses the effect of corporate governance tools. The review has shown that the external auditor can restrict earnings management activities. Further, it pointed out the crucial importance of the audit committee and the independent financial expert. Especially in case of cooperation between the audit committee and the external auditor the probability to restrict the management from manipulating the earnings increases. Finally, prior studies on owner-

ship structures demonstrate that managerial ownership as well as institutional and foreign investors positively influences the earnings quality.

Previous research on earnings management analyzed the utility of accounting comparability. The review showed that standard setters and accounting regulators have long stressed the importance of financial statement comparability as one of the key characteristics to evaluate earnings quality. An increased level of comparability can improve the effectiveness of monitoring regarding earnings management. In this context, the review showed that the XBRL-formatted financial statements provide better data for the purpose of comparability research. The data is machine-readable and it is not aggregated.

Furthermore, the review presented the important role of the notes to the accounts in financial reporting. Previous research found out that the notes provide qualitative information which is otherwise not shown on the face of the financial statements. It was shown that this improves the understanding of the firm's financial situation as well as the current and future earnings. This in turn reduces information asymmetries according to the previous literature. The findings draw on communication theory. In addition, the review of disclosure quality research demonstrated that more transparent information environment reduces the propensity to manipulate the earnings. In contrast, managers opportunistically influence earnings when disclosures are more complex according to the manipulation theory.

In conclusion, the review showed that there is a growing number of papers examining the properties and benefits of accounting comparability research. The majority of researchers focused on the comparability across firms audited by the same auditor and across countries. However, there is a lack of research on within-industry comparability. Firms within the same industry should possess similar accounting due to their exposure to a same set of economic events and circumstances. Dissimilarities of accounting information within the same industry can indicate earnings manipulations. Therefore, studies on firm-year level have to be done in order to analyze the within-industry comparability.

Further, the majority of researchers studying the benefits of accounting comparability apply an output-based comparability score developed by De Franco et al. (2011). However, this comparability measure is based on earnings itself. An input-based comparability score is more appropriate for examining earnings management. However, the litera-

ture is still lacking regarding input-based measures. Previous comparability research did not focus on the properties and benefits of accounting inputs, such as accounting policies. Especially the adoption of industry-specific accounting policies increases the level of comparability. This in turn reduces the opportunities to implement earnings management without scrutiny. Therefore, accounting inputs need to be considered as an additional aspect of earnings quality.

The vast majority of previous research in the field of accounting comparability is limited on quantitative financial information. The analysis is objective and straightforward to construct since it is based on figures of the primary financial statements. However, literature is still lacking on comparability and similarity of the qualitative information provided by the notes. This is despite the fact that the notes provide additional explanations which are especially useful to detect earnings management. Similarities of the notes increase the transparency of information environment. A higher level of transparency causes improved possibilities for users to compare earnings quality. This in turn increases the risk of scrutiny and might restrict the management from manipulating the earnings. Hence, this research analyzes the relationship between similarities of the notes and earnings management. It is different from the previous research by focusing on firm-year level which should outline the within-industry comparability. Since more similar notes should also restrict managers from real cash flow decisions, the analysis includes both variants of earnings management.

The review showed that XBRL standard is fairly new in accounting research. Although there are multiple advantages of using XBRL, it received only little attention compared to other data sources. Critical voices in accounting literature state that the XBRL conversion is still in progress and thus, the time-series availability is limited. However, the literature review showed that the availability of accounting data in XBRL format constantly improved over the previous years. Therefore, this study uses detail-tagged notes in XBRL format retrieved from SEC EDGAR database. In contrast to previous studies, this approach allows analyzing different parts of the notes. Those particular parts of the notes could have slightly different properties regarding disclosure and earnings quality. Furthermore, the machine-readable XBRL format provides an effective way to measure the textual similarity of the notes. The next chapter explores the research methodology to achieve the research aim. Since previous research did not focus on similarity of the notes, it first needs to be specified which factors determine similarity of the notes.

3 Research Methodology

This chapter aims to point out the overall approach of this research about the relationship between financial notes to the accounts and earnings management. It will describe the research approach and look upon the tools, measures and research design employed in this PhD thesis.

3.1 Introduction

Having reviewed the extant literature in the field of research, the next step of this PhD thesis is to explain the adopted research methodology. This constitutes the basis to achieve the research objectives (Ryan et al., 2002). Therefore, this chapter attempts to demonstrate the overall philosophical and methodological approach to the reader of the study. This is of crucial importance to understand the research strategy in order to answer the research questions. Since the research philosophy has a significant influence on the methodological approach and the way to understand knowledge, the next section of this chapter provides an overview about the different research paradigms and the choice of a suitable philosophical underpinning to conduct this study. Further, section 3.3 outlines the importance of an appropriate research approach. This section explains how the research paradigm influences the research approach and the difference between an inductive and a deductive approach. Finally, section 3.4 concludes this chapter by discussing the ethical considerations of this PhD thesis.

3.2 Research Philosophy

The research philosophy can be described through the elaboration of the researcher's epistemological and ontological positions (Easterby-Smith et al., 2008).

It is essential to know the researcher`s perspective in order to understand the process of formulating the research questions, choosing the research approach and analyzing the data (Guba and Lincoln, 1994). According to Crotty (1998), the research philosophy is identified as a fundamental element of the research process. In general, these four elements determine the research process including the decision about appropriate strategies and methods (Hopper and Powell, 1985). The study of Guba and Lincoln (1994) followed this approach and even advanced it. They suggest that the researcher's

philosophical position is to be answered prior to the process of conducting the research. This is due to the fact that these assumptions influence the whole research process.

In order to determine the philosophical assumption underlying this PhD thesis, the epistemological and ontological position needs to be classified (Easterby-Smith et al., 2008).

In particular, the term ontology refers to the question what exists to be searched (Walliman, 2016). The first ontological question would be what do we know and the second question would be how the researcher can know this. In summary, ontology deals with the question of reality while the epistemology is concerned with the knowledge and the truth. The initial question is how the researcher comes to know.

It has to be noted that there is an interrelationship between ontology, epistemology, methodology, methods and data sources. This is illustrated in the following figure below.

Figure 5: Interrelationship according to Grix (2018)
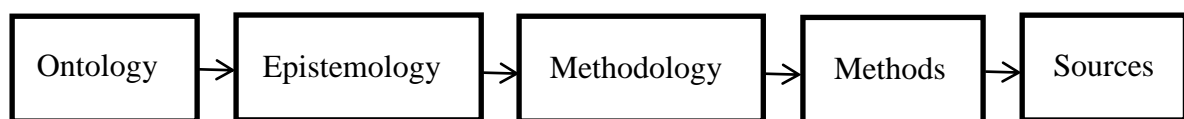
In summary, the philosophy of reality is explained by the ontology while epistemology defines how the knowledge about reality can be gained (Hopper et al., 2007). The methodology addresses the different practices to conduct research and acquire knowledge. The research methods include the procedures that can be used to gain the data. However, this depends on the accessible data sources.

According to Kuhn (2012), the complexity of research perspectives could be simplified through the use of paradigms. Those can be compared to a map for the nature of reality and truth (Kuhn, 2012). In literature the term 'paradigm' is defined as "[...]progress of scientific practice based on people`s philosophies and assumptions about the world[...]" (Collis and Hussey, 2013, p. 47) and the nature of reality and truth. The following sections outline the differences between positivist, realist, interpretivist and phenomenological paradigm.

The paradigm of the researcher refers to the research philosophy (Collis and Hussey, 2013). It describes the researcher`s worldview regarding the nature of knowledge. In general, there are two extremes regarding the paradigm which are the phenomenological paradigm and the positivist paradigm. Depending on the research paradigm, there are completely different assumptions regarding the nature of reality. Furthermore, the assumption concerning the role of the researcher, his influence and the relationship towards the research objective have to be taken into account.

From the ontological point of view, the positivist believes that reality exists independently of the researcher (Easterby-Smith et al., 2008). According to Maylor and Blackmon (2005), the positivist regards the reality as something external and objective.

In correspondence with that, the realist also takes the view that reality is objective. Further, the ontological worldview of the realism states that reality is independent of the fact whether the researcher knows of its existence (Silverman, 2017). However, the critical realist beliefs that there is some interpretivism in reality through social conditioning (Easterby-Smith et al., 2008).

Moreover, interprets take the view that reality is subjective and can be socially structured. Thus, the reality may change and can be multiple. With regard to the ontological standpoint, the phenomenological paradigm also states that reality is subjective (Healy and Perry, 2000). Further, the nature of reality is dependent on the researchers since they are a part of the research (Collis and Hussey, 2013).

From the epistemological standpoint, the positivist takes the view that reliable data can only be collected through observable facts or phenomena. The positivist aims to generalize through causality rules and laws. In addition, the realist focuses on explaining observable phenomena within a context. Moreover, the critical realist beliefs that each phenomenon establishes sensations and thus, there is a risk of misinterpretation. In contrast, the interpretivism paradigm focuses on the reality behind phenomena. According to the interpretivism paradigm there are subjective meanings of the truths (Easterby-Smith et al., 2008). In line with this, the phenomenological paradigm also beliefs that knowledge is subjective and there are different meanings of a phenomenon (Collis and Hussey, 2013).

Beside the researcher`s epistemological and ontological positions, the axiology might influence the research philosophy. Axiology describes the role of values in the research-

ers` worldview. In particular, the positivist takes the view that values do not influence the research process. The conducted research is value-free. In contrast, the paradigm of realism is characterized by the axiological view that the researcher is biased through own experiences, educational background and interaction with other individuals (Tranfield et al., 2003). This might influence the research and the interpretation of results. The interpretivism paradigm even states that values play a key role regarding the interpretation of results. According to the phenomenological paradigm, the researcher himself is part of the conducted research. Thus, the values have an impact on the research.

Defining the underlying research position of this study, the nature of this PhD thesis has also to be taken into account. It aims to examine the interaction between textual similarity of the notes to the accounts and earnings management behaviour. Indeed, it draws on empirical findings from the statistical analysis of financial statement data. Further, it has to be considered that there is a lack of existing theory regarding the relationship between similarities of the notes to the accounts and earnings quality. Therefore, it was prerequisite to draw on theories from closely related areas of research in the fields of earnings management, accounting comparability, disclosure quality and corporate governance. In addition, the review of statutory provisions, regulations and jurisdictions within the area of accounting and auditing was necessary in order to formulate the research questions. In summary, this empirical study about the relationship between similarities of the notes to the accounts and earnings management can be described as objective. Thus, this research belongs to the `Positivism´ paradigm which is discussed more detailed in the following section.

According to the definition of Walliman, the positivist paradigm was originally applied by the "[...]natural sciences to the study of social reality, an objective approach that can test theories and establish scientific laws." (Walliman, 2016, p. 15). There is an objective truth which the positivist aims to reveal through quantitative research methods. The focus is on the statistical measurement of relationships between different phenomena which are systematically expressed by variables (Pettigrew and McKechnie, 2001). The positivist aims to approve or disprove hypothesis through quantitative methods (Saunders et al., 2015).

In summary, the view of the positivism paradigm corresponds with the philosophical underpinning of this PhD thesis. From the ontological point of view, the examined interaction between textual similarity of the notes to the accounts and earnings manage-

ment behaviour exists independently of the researcher. Thus, this accounting phenomenon is something external and objective. Further, the textual similarities of the notes to the accounts as well as the implementation of earnings management are observable phenomena. These are expected to provide credible data from the epistemological standpoint. Moreover, this research focuses on causality between textual similarities of the notes to the accounts and earnings management behaviour. This corresponds with the positivists´ preference for generalization. From the axiological point of view, this research is conducted free of any values. The researcher has an objective stance and is not part of the research.

3.3 Research Approach

Following the discussion of the research philosophy and paradigm, the choice of an appropriate research methodology and methods is fundamental in order to gain reliable data. The research methodology and methods play a key role to answer the research questions (Ryan et al., 2002).

Methodology is the strategy, plan of action or design lying behind the choice and use of particular methods (Crotty, 1998). On the one hand, the term `methodology´ includes the principles, procedures, tasks, tools and techniques, which are required to obtain the data for the particular research (Bryman and Bell, 2015). On the other hand, it also comprises the methods and concepts for analyzing the information.

This PhD thesis aims to find out whether there is an interaction between textual similarity of the notes to the accounts and earnings management behaviour. In order to prove this relationship, a statistical analysis could lead to valuable facts. Empirical data could lead to approval or disproval of hypothesis. Therefore, a quantitative research approach seems to be appropriate for this study of the notes to the accounts.

With regard to formulating the research questions and hypothesis, it has to be considered that there is no existing theory in accounting literature. Previous research does not explain the interaction between textual similarities in the notes to the accounts and the implementation of earnings management. Due to the lack of existing theory, the theoretical framework of this research needs to be developed. For this purpose, this PhD thesis draws on theories from closely related areas of research in the fields of earnings man-

agement, corporate governance, accounting comparability and disclosure quality. In conclusion, a theoretical research approach is required beside the empirical analysis.

In particular, the theoretical research approach includes the review of existing hypothesis, theories, provisions, regulations and jurisdictions. It aims to put existing knowledge into new perspectives and to find conclusions, which the previous literature did not take into account (Dwyer and Buckle, 2009). In addition to the development of a new theory, the theoretical research might lead to findings concerning impacts of research results and possible relations to other fields of research. Consequently, an in-depth explanation of earnings management, accounting comparability, disclosure quality, XBRL technology and corporate governance is required. There is not a single method which could be applied to fulfill all these requirements. Thus, a mixed method approach seems appropriate in order to ensure contribution to theory and practice.

The above outlined combination of conducting a theoretical and statistical study leads to a further separation regarding the relationship between both theory and research. This relates to the choice of either an inductive or a deductive approach (Cepeda and Martin, 2005). Both stem from the Latin word 'ducere', which means 'to lead', but with the two prewords 'in' and 'de'. In this context, 'in' and 'de' must be interpreted as 'in' and 'from' which changes the meaning to 'put in' and 'derive from'. The distinction between an inductive and a deductive approach is required to specify the relationship between theory and conducted empirical research (Bryman and Bell, 2015).

According to Saunders et al. (2012), there is a direct impact of the research philosophy (e.g. the adopted research paradigm) to the choice of either deduction or induction. The deductive approach is appropriate for a positivism research paradigm. This is due to the fact that deduction aims to explain causality and associations between the variables (Saunders et al., 2012). However, it is first required to develop a hypothesis by drawing on extant knowledge before testing any causality effects and associations. Hence, the deductive approach begins with the known information. Then this hypothesis is tested by empirical analysis. In conclusion, the deductive approach moves from theory to empirical data. On contrary to this, the inductive research approach states that theory is resulting from empirical research. This means that induction draws inferences from qualitative data instead of quantitative research results.

As explained in the preceding paragraph, the deductive approach defines the specific framework for this PhD thesis. However, it must be taken into account that the choice of a deductive approach leads to several challenges for conducting this study. First, it requires to identify relevant theories and research results from extant literature. This constitutes the basis to develop the hypotheses. During a further step, it is required to search and select appropriate key variables and control variables to test the hypotheses. Also, reliable proxies and measurements need to be adopted in order to design the statistical models. According to Bryman and Bell (2015), the research design complies with the deductive approach if it leads to value-free quantitative data by using a large sample.

In particular, the aim of this PhD thesis is to analyze and explain the impact of more similar notes to the accounts on earnings quality by focusing on within-industry similarity of the notes. Thus, it is fundamental to have robust statistical values that prove or disprove the association between textual similarities of the notes and earnings management behaviour. However, it is first required to develop the hypothesis in the following chapter 4. For this purpose the extant literature from closely related areas of research is reviewed. Based on the literature study of physical text documents and documents from electronic databases, theoretically sustained hypotheses are developed. This fundamental step of the study aims to provide theoretical backgrounds and explanations that are required to construct and compute the hypotheses tests (see chapter 6). In accordance with the deductive approach, this research uses the theory as a tool to explain testable hypotheses (Grix, 2018). Then the data is collected and analyzed in order to prove or disprove these hypotheses (Bryman and Bell, 2015). In conclusion, this PhD thesis follows a clearly deductive approach and prove the relationship between financial notes to the accounts and earnings management based on quantitative data. A large sample consisting of 1,447 firm-year observations provides robust empirical evidence (see section 6.1).

As outlined in the sections above, the process of choosing the most appropriate research method is multilayered (Riley et al., 2007). The researcher has to take into account the methods and instruments that are suitable and available to answer the particular research questions (Feilzer, 2011). In connection with the decision for a method, the researcher has to ensure that there is data accessible. This is the case for the detail-tagged 10-K filings in XBRL format. As explained in section 5.4 there is a free data access to the SEC EDGAR database.

Beside the data access, it is crucial to define the role of the researcher. It needs to be specified which skills and capabilities are required to conduct this research. According to Gill and Johnson (2010), a highly structured methodology is expected from a positivist. This study requires statistical knowledge and experience of the researcher. Further, the educational background in the field of accounting and finance is fundamental in order to formulate appropriate research questions and hypothesis. As outlined above, these required the development of a new theory about the interaction between textual similarity of the notes to the accounts and earnings management behaviour. Nevertheless, the ethical considerations may not be overlooked. Therefore, the research ethics are discussed in the following section.

3.4 Research Ethics

Ethics are related to the human behaviour and can be described as a set of moral principles (Easterby-Smith, 2008). Philosophers characterize ethics as moral standards in order to judge about the rightness or wrongness of something (Hosmer, 1995).

According to Creswell (2018), ethical issues might occur throughout the entire research process. Thus, reflection of ethical aspects is required during the definition of aims and objectives, collection and analysis of data and writing of thesis. This is essential to realize any possible violation against ethical guidelines in early stages. The data must be destructed completely if ethical issues arise and cannot be avoided (Hesse-Biber, 2017).

This PhD thesis follows the University's requirements in order to conduct research in consideration of ethical issues. According to the University Research Degree Committee (URDC), "Researchers should avoid, wherever possible, actions which may have deleterious consequences for other researchers or which might undermine the reputation of their discipline." (URDC, 2008, p. 4). Therefore, the moral integrity plays a key role. The researcher must be aware of his responsibility. For instance, the gained data and results need to be validated (Patton, 2015). This proves the academic quality of research.

Furthermore, it has to be stated that the independence of the researcher is essential for an unbiased analysis and answering of the research questions. Otherwise, there is a risk that the researcher withholds relevant information or interprets research results wrong.

This PhD thesis does not involve any participants. Neither humans nor live animals are involved by the underlying research. There is no risk of any discrimination, e.g. due to nationality or religion. Further, the empirical analysis of the notes to the accounts does not deal with any "[...]sensitive aspects of the subject's[...]" (URDC, 2008, p. 4). Thus, any approval requirements according to the 'The University of Gloucestershire`s Handbook of Research Ethics' are not relevant.

In general, the data gathered for this research were stored electronically. However, the collected data which was not included in this PhD thesis or the Appendix was deleted and shredded. Thus, the risk of data security regarding these unused data could be avoided. Moreover, data was shared with other researchers, peers and the supervisors. The researcher of this PhD thesis undertook the following steps to ensure data security. First, e-mails were encrypted and the passwords were sent in separate messages. Second, telephone and conference calls were held via eavesdrop-secure connections.

In context with the ethics taken into account for this research, it has to be stated that there exists also ethics for professional accountants in the U.S. As described, the CPA is a fundamental part of market economy with regard to the reliability of the accounting information. In order to maintain the high reputation, it is essential to comply with the code of ethics for professional accountants. In particular, the relevant ethical standards are defined by:

- International Federation of Accountants (IFAC) on International Standards of Auditing (ISA);

- International Accounting Standards Committee (IASC).

There are the following five principles according to the code of ethics specified by IFAC:

(1) Integrity

(2) Objectivity

(3) Professional competence and due care

(4) Confidentiality

(5) Professional behaviour

While the integrity requires honesty, the CPA must work without influence of any bias or self-interest in order to be objective. Indeed, the professional competence is based on the educational background and regular training about legislative changes in the field of accounting. Further, the CPA must treat the gained information confidentially during all stages of business relationship. The professional behaviour does not only require the compliance with any legal regulations, but also the avoidance of actions discrediting the reputation of the profession. For the sake of completeness it is has to be explained that the examination for the CPA degree consists of the following four disciplines:

(1) Auditing and Attestation,

(2) Business Environment,

(3) Concepts, Financial Auditing and

(4) Reporting and Regulation.

As described above, the audit quality might have an impact regarding the implementation of earnings management activities. The author of this thesis is of the opinion that high-quality audit requires the avoidance of any ethical threats. According to the Code of Ethics specified by the IFAC, ethical dilemmas are caused through self interest of the CPA. As shown in the figure 6 below, the term 'self interest' is not only related to financial interests. It includes also professional aims, e.g. an employment with the client (Menon and Williams, 2004).

Figure 6: Overview about self interest threats (Menon and Williams, 2004)
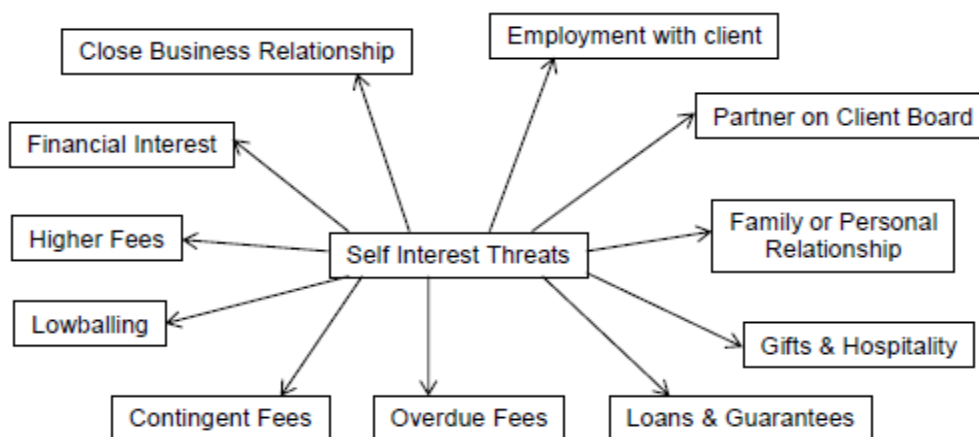
Beside self-interest threats, there could also occur self-review threats if the CPA reviews or re-evaluate results of services provided by him. This relates not only the preparation of the financial statements as illustrated by the figures 7 in the following.

Figure 7: Self review threats (Menon and Williams, 2004)
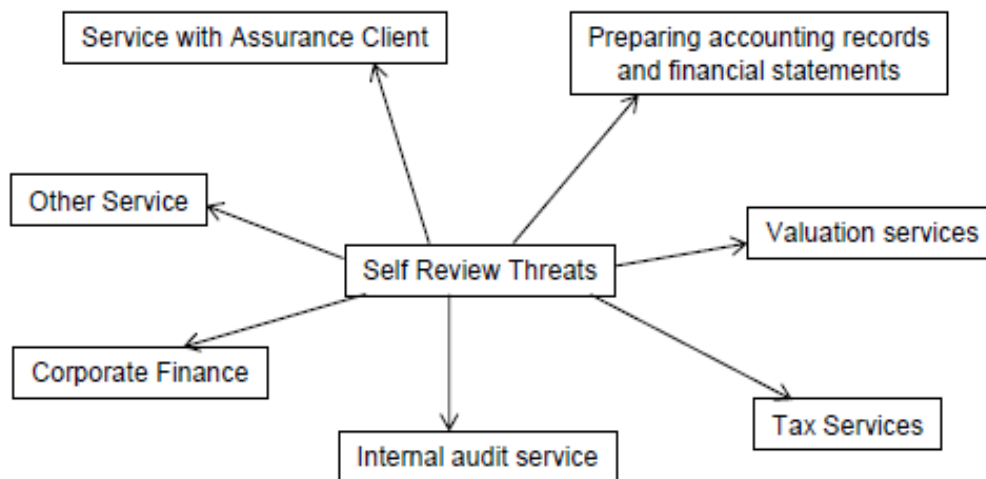
Self-review threats arise also if the CPA provides tax or valuation services for the audited firm. However, regarding the detection of earnings management activities, there is the highest risk of self-review threats if the CPA prepares the financial statements. According to the accounting literature, this leads to loss of reliability and objectivity of the audit certificate. There is a close relationship between self-review threats and the phenomenon of management threat. According to the Accounting Practicing Board (APB), management threat is caused if the CPA takes decisions that are in the responsibility or judgement of the chief financial officer (CFO). In practice, there is also the risk of management threat if the CFO involves the CPA in plans to manage the earnings up or downwards. As a consequence, the performed audit will not lead to reliability of the audit certificate. Therefore, the CPA must refuse to take any management decisions in order to comply with the ethical standards by the APB.

In order to ensure high-quality audits which lead to a higher probability regarding the detection of earnings management activities, it is essential to identify the above described threats of independence. In order to comply with the code of ethics, it is beneficial to implement a review process by an independent third party or by involving the audit committee.

Following the above discussed ethical guidelines, it is important to take the role of the researcher into account. The author of this PhD thesis is a certified public auditor in Germany. As mentioned above there are the Code of Ethics specified by the IFAC and the ethical standards by the APB for professional accountants in the U.S. Comparable to those regulations, German public auditors have to comply with the so called "Wirtschaftsprüferordnung" (Legal Guideline for public auditors, WPO). According to section 57 lit. B of WPO, the researcher has to comply with data privacy. The data must be kept anonymously. If the researcher would violate against data security, the professional chamber could penalize him (section 43 WPO). This penalty can be e.g. a penalty payment or even the loose of license to practice.

As outlined above, the present study examines the relationship between financial notes to the accounts and earnings management. In particular, the textual similarity of notes to the accounts relative to other firms in the same industry was analyzed. In order to collect the relevant data for this research, XBRL-tagged 10-K filings from the SEC EDGAR database are analyzed. There is no personal data that could be associated with any firms of the underlying financial statements. Nevertheless, it was pointed out that only large accelerated firms are obliged to tag their notes to the accounts as a block of text in XBRL format to the EDGAR database (SEC, 2009). Consequently, any potential reader of this research knows that large accelerated firms are included by this study (see section 13.3). However, anonymity of research data is guaranteed. This research does not provide any information regarding the firm names, seat of the firm or any business secrets of the corporations included by the data sample. The researcher took care that this PhD thesis strictly complies with the ethical guidelines provided through 'The University of Gloucestershire`s Handbook of Research Ethics'. To the best of the researcher`s knowledge and belief, it does not cause any ethical issues.

As pointed out above, the role of the researcher is fundamental regarding the ability and willingness to comply with ethical standards. In addition to the ethical aspect, the educational background of the researcher is also advantageous for conducting research in this field of study. The professional knowledge in accounting and auditing is valuable to develop the hypotheses of this PhD thesis. Further, it allows contextualizing the empirical results.

4 Research Problem and Hypothesis Development

This chapter points out the research problem concerning the relationship between the financial notes to the accounts and earnings management. The extant literature did not explore the impact of more similar accounting policy and revenue recognition disclosures on earnings quality. In the following it is demonstrated that there are reliable arguments to do so. By drawing on extant theories and empirical results from closely related areas of research the hypotheses of this PhD thesis are formulated.

4.1 Financial Notes to the Accounts and Accrual-based Earnings Management

No theory has been put forward to explain the interaction between similarities of the notes to the accounts and earnings management behaviour. Empirical research thus far assumes that a theoretical relation between similarities of the notes and earnings quality probably does not exist (Peterson et al., 2015). Due to the lack of existing theory, this PhD thesis draws on empirical findings and theories from closely related areas of research in the fields of accounting comparability, disclosure quality and disclosure complexity.

This PhD thesis uses the data from detail-tagged XBRL notes. The data is available in the 10-K reports filed with the SEC (Cazier and Pfeiffer, 2017). The 10-K filings can be obtained by using Python programming language (Ashraf, 2017). Despite the availability and accessibility of data, there are only a few studies about textual similarity analysis of 10-K reports. First, Loughran and McDonald (2011) examined the tone of the text issued by the notes in the 10-K filings. Then, they analyzed its readability in a later research (Loughran and McDonald, 2014). Further, the study of Cohen et al. (2014) explored changes in the MD&A section of the notes by drawing on the findings of Brown and Tucker (2011).

In contrast, accounting comparability and its merits have been subject to a stream of contemporary research papers. For instance, Sohn (2011) finds that accrual-based earnings management decrease and real earnings management increase with financial statement comparability. Campbell and Yeung (2017) study the role of accounting comparability and investors' attention when peer firms restate earnings. The research of Peterson et al. (2015) explores the time series consistency of textual information in the notes and

its effects on earnings quality. Their findings show that firms with similar accounting policy disclosures have lower discretionary accruals. However, they did not focus on different parts of the notes to the accounts. Also, the study of Peterson et al. (2015) is limited to accrual-based earnings management.

Standard setters have long stressed the importance of financial statement comparability as one of the key qualitative characteristics that enables users to evaluate earnings and the financial situation of firms (IASB, 2010; FASB, 2010; FASB, 1980). While a large part of the literature concentrates on cross-country accounting comparability (Barth et al., 2012), research on firm-specific comparability of qualitative accounting information and its effect on earnings quality is scarce. As an important paper for the comparability research, De Franco et al. (2011) introduce a comparability score that enables to operationalize accounting comparability. They base their comparability measure on the mapping between earnings and stock returns across firms. Their comparability measure is positively related to analysts following and forecast accuracy, implying that comparability improves the quality of information about financial statements.

According to De Franco et al. (2011, p. 899), "[t]wo firms have comparable accounting systems if, for a given set of economic events, they produce similar financial statements." This PhD thesis follows De Franco et al. (2011) by assuming that firms in the same industry possess similar accounting due to their exposure to the same economic events. The assumption is that firms in the same industry are subject to similar risks, growth perspectives, and eventually similar accruals and cash flows. Extending this line of reasoning, firms within an industry should therefore also disclose similar qualitative information in their accounting policy and revenue recognition disclosures. This in turn should lead to similar earnings and accruals attributes such as discretionary accruals.

By drawing on the findings of extant studies from closely related areas of research, it is assumed that there should be a stronger relationship between more similar notes and earnings quality for firms within the same industry (Peterson et al., 2015). This is due to the fact that dissimilar notes of firms across different industries are caused by multiple reasons. For instance, there is a higher probability that the underlying business models are completely different (Kim et al., 2016). Also, firms across different industries have deviating operating strategies. Therefore, these firms adopt various accounting choices which are not necessarily related to earnings management activities. However, those different accounting choices would lead to dissimilar accounting policy disclosures

which in turn result in lower similarity scores. Consequently, this research focuses on firms within the same industry.

This PhD thesis aims to further investigate which factors determine similarity of the notes and the properties of word-choice similarities. In this context, Peterson et al. (2015) show that accounting policy disclosures are substantially more similar within an industry compared to disclosures of firms across industries. This supports the conjecture that similar economic events of an industry are mapped into similar accounting policy disclosures.

In line with the comparability theory, this PhD thesis takes the assumption that comparable and similar levels in these disclosures are an indicator for complying with industry standards and for having less abnormal levels of accruals. However, there is a limitation regarding the utility of within-industry similarity of disclosures in explaining earnings quality. The similarity of the notes should not be correlated with all earnings management proxies. Therefore, this research aims to identify and use proxies that affect the similarity of the notes.

According to DeFond and Hung (2003), heterogeneity in accounting method choices can actually reduce earnings comparability across firms. This supports the assumption of the present thesis that heterogeneity in accounting policy notes might explain differences in discretionary accruals. Also, this PhD thesis takes the assumption that companies, which adopt industry-specific accounting policies, and, as a result, have more similar accounting information, are more transparent in how they conduct their business. This in turn should lead to more similar textual descriptions in the accounting policy disclosures. Thus, the adoption of industry-specific accounting policies increases the similarity of the notes (Qianqian and Shen, 2018).

In correspondence with this line of reasoning, Altamuro et al. (2005) state that aggressive accounting policy choices are linked with higher magnitudes of earnings management. They analyze aggressive revenue recognition by comparing firms that accelerated revenue recognition in the less conservative pre-Staff Accounting Bulletin (SAB) No. 101 era with the more conservative post-era. The Staff Accounting Bulletin (SAB) 101 was issued by the SEC in December 1999 to curtail abuses in revenue recognition. In this context, the SEC set out specific guidelines and criteria when to recognize revenue (SEC, 1999). As a result, the firms in the study of Altamuro et al. (2005) were more

likely to meet important benchmarks in the less conservative era, suggesting that conservatism in revenue recognition is associated with less earnings management. The present PhD thesis extends this line of research by assuming that more accelerated revenue recognition is captured in less similar revenue recognition disclosures across firms within the same industry.

Disclosure quality theory is based on principal-agency theory (Garrett et al., 2014). Increased levels – and this research argues more similar levels – of disclosures are seen as a monitoring mechanism to mitigate agency costs between management and shareholders (Huang and Zhang, 2012). For example, Lang and Lundholm (1996) find that more informative disclosures are related to larger analyst following, less dispersion among analyst forecasts, and less volatility in forecast revisions. Similar findings by De Franco et al. (2011) and Hope (2003) suggest that accounting comparability and detailed disclosures help to reduce information asymmetries. The existence of information asymmetries between management and stakeholders increases the opportunities for earnings management (Schipper, 1989). The study of Richardson (2000) shows that information asymmetry measured as the bid-ask spread and the dispersion in analysts' forecasts is positively linked to earnings management activities. Thus, there is a second rationale that links disclosure quality and earnings management. Bringing together both rationales, theory and empirical findings suggest that disclosure quality makes users of financial statements better informed, and, as a result, constrains managers' propensity to manage earnings. Against the backdrop that prior studies of disclosure quality research do not necessarily consider differences in levels of comparability between the notes, there are reliable arguments to do so. In particular, the similarity scores of the accounting policy and revenue recognition disclosures could serve as an additional proxy which captures an additional aspect of disclosure quality. Further, there is an association between disclosure quality and earnings quality (Chen et al., 2015). Hence, this research posits that having more similar notes is a monitoring mechanism that is inversely related to accrual-based earnings management activities. In this context, it must be explained that the degree of similarity between two text documents is measured by the 'score'.

As opposed to this PhD thesis, the majority of related research uses an output-based comparability measure as introduced by De Franco et al. (2011). However, previous research complained that "[…]researchers must make difficult design choices with such a measure and that data can be difficult to obtain[…]" De Franco et al. (2011, p. 4). This

research alleviates these concerns by demonstrating that the design choices can be facilitated through application of cosine similarity measure. Further, it is shown that the required data to obtain the input-based measure is easily accessible through XBRL-formatted notes from SEC EDGAR database.

Indeed, there are reliable arguments to adopt an input-based measure for the analysis of this study. The use of an output-based measure is not appropriate to capture the degree of similarity in the accounting policy and revenue recognition disclosures of industry peers. In the following, the main differences between input-based and output-based comparability measures are discussed. First, the input-based measure considers accounting inputs, such as accounting policies as an additional proxy for accounting comparability. The degree of comparability is measured through the similarity of the notes which does not capture variation in the firm's performance. In contrast, output-based measures as used by De Franco et al. (2011) are based on the firms' earnings-return relation. It is based on earnings itself (Peterson et al., 2015).

Second, the output-based measure by De Franco et al. (2011) has another disadvantage. The accounting comparability indicator includes the full application of accounting policies. However, there should not necessarily be an ultimate effect of the application of accounting policies on the earnings. For instance, it is possible that two firms describe their accounting policy choices identical, but implement details of the accounting rules differently. Therefore, the input-based measure adopted by this PhD thesis does not rely upon the application, but rather the policy description in the notes.

Finally, the comparison between input- and output-based measures shows that the latter one causes more consequences in the economic sense. This is due to the fact that the application of accounting policies influences the amount of profit or loss. In contrast, the textual description in the notes has no direct impact on the reported figures. Previous research found out that the application of accounting policies can be influenced by multiple factors, e.g. market inefficiency or growth prospects (Leary and Roberts, 2014; Gross and Perotti, 2017). This means that the output-based measure captures further economic effects beside the earnings quality itself. Therefore, it may not be accurate to evaluate the earnings quality.

In addition, it has to be noted that the input-based approach used by this study extends the previous research. While the paper of Peterson et al. (2015) is limited to the analysis

of accounting policy notes, this PhD thesis employs two similarity scores. The first one includes the full set of accounting policy disclosures and the second accounting policy similarity score only includes revenue recognition disclosures. By doing this, the present PhD thesis sheds light on properties and benefits of different sections of the notes. Those particular parts of the notes could have slightly different properties regarding earnings quality. Revenue recognition disclosures are used, as they contain information about a firm's future earnings. In essence, revenue recognition is a universal accounting issue (Peterson, 2012) and misreported revenues are one of the most common reasons for restatements (GAO, 2002; GAO, 2006). Lower similarity in revenue recognition disclosures would indicate if firms assess the appropriateness of principles related to recognition of revenue differently.

In conclusion, an input-based accounting similarity score may be better suited for exploring a relation between the notes and earnings management. It provides exogenous evidence and is not based on earnings itself. Further, it does not only allow to evaluate the earnings quality, but also introduces an alternative measure for future research. Especially the detail-tagged XBRL notes from 10-K filings provide new opportunities by focusing on different parts of the notes.

If this analysis shows confirmatory results, there are two important benefits. First, it would boost confidence in this new approach to measure textual similarity of the notes. Second, significant empirical findings could prove that the use of XBRL data leads to validate research results. Hence, this analysis could motivate future research to examine documents in XBRL format.

Moreover, the extant literature suggests that firms opportunistically manage earnings when their notes are more complex (Hoitash and Hoitash, 2018). This phenomenon is subject to the manipulation theory which was introduced by Peterson (2012). The manipulation theory suggests that the complexity of the notes provides managers with the opportunity to manage earnings. This is due to the fact that external users are less informed if there is a lower level of transparency in the financial reporting (Peterson, 2012). For example, Picconi (2006) shows that managers conduct earnings management when pension accounting is more complex. Then the analysts do not fully incorporate information available in pension notes in their forecasts. In the same vein, Hunton et al. (2006) find in their experimental study that managers dramatically reduce earnings management activities if the presentation of comprehensive income is more transparent.

This PhD thesis draws on the manipulation theory and analyzes which factors determine accounting complexity and its effects on disclosure quality. Dissimilar notes may be a part of accounting complexity, as it increases the uncertainty about disclosed information. This in turn impairs the users' understanding of the mapping from economic events into qualitative accounting information.

This PhD thesis takes into account that there are multiple variants of measurement which proxies for different facets of earnings management (Dechow et al., 2010). There are not only the discretionary accruals to measure for accrual-based earnings management, but also other proxies, e.g. beating earnings benchmarks, restatements, timely loss recognition and the earnings response coefficients (Collins et al., 2017). However, the latter ones do not significantly affect accounting comparability pursuant to prior research (De Franco et al., 2011; Peterson et al., 2015). By drawing on these extant studies, this PhD thesis only includes certain earnings quality proxies that are expected to be affected by similarity of the notes.

There is a major concern in all of the aforementioned studies. This concern relates to the lack of clear-cut causation. Since both financial disclosures and earnings management are an outcome of managers' decision, causality can run in both directions at the same time (Lang and Stice-Lawrence, 2015). Applied to the case of the present PhD thesis, it is not clear whether the propensity to manage earnings stems from the quality of accounting information provided by similar notes or whether dissimilar notes are a result of the decision to manage earnings in the first place. While some studies do not address this issue (e.g. Peterson et al., 2015), Lobo and Zhou (2001) argue that both disclosure quality and earnings management are jointly endogenously determined. As a result, the similarity measure might be endogenous. In conclusion, this risk is caused through managerial discretion and flexibility over accounting methods, disclosure options, and how to draw up textual notes to the accounts.

With regard to the above mentioned cause-and-effect issue, it has to be stated that the conducted literature review showed that there are several outside factors that could influence the decision about earnings management activities. For instance, the institutional and foreign investors or the external auditors might have an impact on earnings management. The conducted literature review proved that it is not always the same group of persons deciding about the implementation of earnings management and the content of the notes (e.g. Beck and Mauldin, 2014; Garrett et al., 2014). Due to this fact, there

might be a reduced level of circular reasoning concerning the relationship between earnings management and the textual similarity of the notes.

Nevertheless, in order to address this possible cause-and-effect problem, the present research uses a lagged similarity measure of the notes to the accounts as an independent variable in the OLS regressions. There are the following three reasons to do this. First, as two-stage least squares are deemed to be a remedy to study causal relationships, the researcher of this study does not identify a suitable instrument variable for the endogenous similarity variable of the notes to the accounts. Second, the properties of accounting policy disclosures of the previous year should be less affected by earnings management decisions of the following year, thus making it more exogenous than similarity scores of the notes to the accounts of the same year. This is in line with the research of Nikolaev and Van Lent (2005). This paper studies the effect of disclosure policy on cost-of-debt. Nikolaev and Van Lent (2005) measure their dependent cost-of-debt variable at $t+1$, while their independent variables are measured at t in their OLS regressions. Due to this reason, Nikolaev and Van Lent (2005, p. 689-690) "consider these [independent] variables as *predetermined*" and argue that "[t]his is a common method to make plausible that innovations in the dependent variable are uncorrelated with the explanatory variables (i.e. to reduce the likelihood of simultaneity bias)." The additional explanatory variables are used in order to check the reliability of the primary result.

Third, the derived theory suggests that industry-specific accounting policies, and, as a result, similar notes to the accounts are a precondition as well as a proxy for a better accounting information environment. This constrains managers' incentives and possibilities in conducting future earnings management activities (Qianqian and Shen, 2018). Moreover, the preparation and filing of annual financial statements including the notes take place during the first months of the following fiscal year (McMullin, 2014). Lagging the independent variable similarity of the notes to the accounts is actually in line with theory and could solve simultaneity and reversed causality concerns (Nikolaev and Van Lent, 2005).

In sum, accounting comparability literature suggests that firms that choose industry-specific accounting policies are more comparable to market participants and should therefore contain similar earnings properties, such as discretionary accruals (Qianqian and Shen, 2018). Further, consistent with assumptions made in the disclosure quality research, more similar disclosures enable users of financial statements and experienced

auditors to detect any future earnings management activities and effectively constrain managers from doing so. However, the manipulation theory suggests that more complex and less similar disclosures are an incentive for managers to opportunistically manage earnings. All of these rationales lead to the conclusion that similar levels of notes decrease accrual-based earnings management. Hence, this PhD thesis takes the assumption that similar notes to the accounts represent an aspect of disclosure quality and complexity by allowing users of financial statements to better understand and analyze accounting information, which leads to the first hypothesis, in alternative form:

H1: Firms with more similar notes to the accounts compared to firms in the same industry and year, conduct less accrual-based earnings management.

4.2 Financial Notes to the accounts and Real Earnings Management

To the best of the researcher`s own knowledge, a study about the relationship between the similarity of the notes and real earnings management has not yet been conducted. In general, the thus far derived line of reasoning remains the same, such that similarity in accounting policy disclosures is inversely related to real earnings management. However, differences exist between the characteristics of accrual-based and real earnings management. As suggested by previous research (Chi et al., 2011; Roychowdhury, 2006), real earnings management is less likely to draw attention from auditors or regulators compared to accrual-based earnings management. The majority of auditors state that they find it difficult to distinguish real earnings management from ordinary decisions concerning the operating business of a firm (Commerford et al., 2016). For instance, advertising expenses of firms might be reduced through real cash flow decisions or due to economic reasons. While only the first case employs real earnings management, it is hard to distinguish it from the second one. Furthermore, real cash flow elections offer greater temporal flexibility. While accounting policy choices normally take place at the end of the fiscal year, real cash flow decisions can be made throughout the entire fiscal year (Roychowdhury, 2006).

In result, auditors and users of financial statements should not be able to effectively restrict managers from manipulating real activities, as suggested by the disclosure quality research. Further, this PhD thesis relies on the manipulation theory such that firms with an overall more complex accounting information environment have a higher propensity to engage in real earnings management. Consistent with this assumption,

Hunton et al. (2006) find evidence showing that managers are opportunistically managing real activities by selling available-for-sale securities if the transparency of comprehensive income disclosures is low. Overall, this PhD thesis takes the assumption that there is a one-way causation in such a way that similar notes restrict managers to deviate from normal levels of real earnings management in the specific industry.

Furthermore, as shown by Zang (2012), firms make sequential decisions whether to manipulate real activities or to implement accrual-based earnings management activities. The study of Zang (2012) found out that manipulating real activities precedes managing accruals. His results show that firms regularly switch from real cash flow elections to accrual-based earnings management, but in rarer cases vice versa. Due to this fact, it is of crucial importance to restrict the management from real cash flow elections since this might be the first foray to influence the earnings.

The present research takes this for granted and infers that a key decision to engage in real earnings management during the year is affected by the comparability of audited financial statements of the previous year. In line with the manipulation theory, more sound and similar financial notes to the accounts should lead to more transparent financial statements of firms, which in turn decrease managers' willingness to manage real activities (Zang, 2012). Using contemporaneous similarity scores does not fit in this context. Thus, the two similarity scores are lagged as a result of the sequence between accrual-based and real earnings management.

A possible trade-off effect between real and accrual-based earnings management might also impact the relation between similarity of the notes to the accounts and real earnings management. Zang (2012) finds evidence that managers use both earnings management tools as substitutes in order to achieve earnings targets. According to Zang (2012), the decision to conduct real earnings management depends on the relative costs of accrual-based earnings management and vice versa. In the case of this PhD thesis, as already outlined, higher levels of similarity of the notes to the accounts could appear to be especially costly to manage accruals, because the level of scrutiny by users of financial statements or auditors might be higher. Thus, it would also be conceivable to observe a positive correlation between manipulating real activities and similar notes to the accounts if similar notes represent a component of the relative costs of accrual-based earnings management. However, this study does not include only a subset of firms that are likely to meet reporting goals as in Zang (2012). As a result, the research design of the

present PhD thesis does not allow studying this research question, because it includes a range of firms with divergent incentives. Instead, this paper examines whether similar notes to the accounts constrain firms from managing earnings overall. In conclusion, this research takes the assumption that similar measurement of textual information in the notes to the accounts is a proxy for better accounting information quality. This reduces the levels of both real and accrual-based earnings management altogether. Hence, the second hypothesis in alternative form:

H2: *Firms with similar notes to the accounts compared to firms in the same industry conduct less real earnings management.*

5 Data and Research Methods

This section outlines the exact design and concept of this empirical research about the impact of more similar notes to the accounts on earnings management behaviour.

5.1 Measuring Similarity of the Notes to the Accounts

This PhD thesis measures the similarity in textual notes to the accounts by employing a vector space model, or also called cosine similarity measure. Brown and Tucker (2011) also adopted this model to analyze changes in the MD&A section of the notes in the time series. It is widely used to retrieve information in computer science (Salton et al., 1975).

In general, the cosine similarity measure is an algebraic model. According to Xavier (2003), mathematical models are an important tool for measurement in research. The cosine similarity measure allows researchers to analyze text documents and to represent them as vectors, e.g. index terms. In this context, a term can be a single word, but also longer phrases. In result, text is converted into a vector through cosine similarity measure. Within the scope of this research, the model is applied to the annual accounting policy and revenue recognition disclosures found in the XBRL-formatted notes to the accounts.

According to Manning et al. (2008), vector space models are a robust research method. There is a growing number of studies employing vector space models in the field of information retrieval (e.g. Salton et al., 1975; Schuetze and Pedersen, 1997; Fang, 2015). The vector space model was firstly used for the SMART retrieval system (Podolny et al., 1995). It is also described as term vector model (Salton et al., 1975). Some earlier papers in literature also referred under the term `vector processing model´ to the vector space model (e.g. Manning and Schütze, 1999; Donoho, 2000).

During the beginnings of textual analysis, the Standard Booleam model was introduced by George Boole (1847). It was the first information retrieval model and predecessor of the cosine similarity measure. The Standard Booleam model is used by many researchers in information retrieval. It is based on logical operations and combines the following functions:

- representation for documents

- representation for queries

- representation of the relationships among documents and queries

- ranking system

5.2 The Cosine Similarity Measure

In comparison to the Standard Booleam model, the vector space model is more ad-vanced to operationalize textual similarity (Boritz and No, 2016). It allows the analysis of bigger textual documents in a shorter runtime. The vector space model is also used by internet search engines. Therefore, the vector space model is also described as web crawling algorithms. The vector space model enables the comparison of:

- single words;

- keywords;

- phrases;

- sentences.

In order to measure the similarity of two textual documents, the cosine of the angle be-tween the vectors is calculated. The figure 8 below illustrates an example of a two-dimensional vector space model. There is vector A (Notes 1) and vector B (Notes 2). Both vectors point out from the origin. The cosine Q is the angular separation between A and B. As smaller the angle is as more similar are the compared text documents. The cosine Q measures the similarity of the two vectors of identifiers.

Figure 8: Two-dimensional vector space model
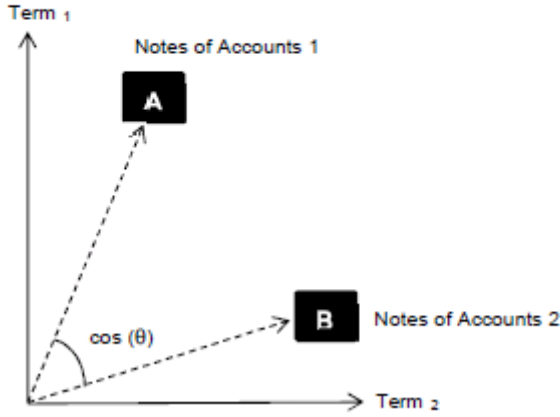
With regard to the figure above, the axes of the vectors A and B represent the unique words in the notes 1 and 2. The magnitude of the axis represents the number of times that the particular word is mentioned in the given textual notes. In result, the total number of elements in the vectors is equal to the total number of unique words used in all included notes to the accounts. In general, the value range for the cosine goes from -1 to 1. However, this is not appropriate for this research. Due to the fact that it is analyzed whether the similarity of the accounting policy and revenue recognition disclosures is related to earnings quality, it is not expedient to assume a negative relationship. Thus, the value of $|Q|$ is used for the cosine Q within the scope of this research.

In particular, the similarity between two textual documents (notes 1 and 2) is calculated by the similarity score which is defined in the following:

$$SimilarityScore = \frac{n_1}{||n_1||} \cdot \frac{n_2}{||n_2||} = \frac{n_1 \cdot n_2}{||n_1|| \cdot ||n_2||}$$

where *SimilarityScore* measures the cosine of the angle between the vectors n_1 and n_2. Therefore, the formula defining the similarity scores is also referred to as the cosine measure. n_1 and n_2 are the vectors of words for the notes of two distinct firms being compared. n_1 x n_2 represents the dot product and $||n_i||$ is the length of vector n that also respresents the vector norm $||n_1|| = \sqrt{n_1 \cdot n_1}$.

However, it is essential to distinguish between the length of a vector and the length of an analyzed document (Vijaymeena and Kavitha, 2016). For instance, the length of n_1 is calculated as $(w_1^2 + w_2^2 + w_3^2 + \ldots + w_n^2)^{1/2}$ while the document length is computed by $(w_1 + w_2 + w_3 + \ldots + w_n)$. The variable w represents the unique words in a document.

In conclusion, the above described measurement allows to facilitate high-dimensional word vectors of the textual notes to a simple matrix of firm's pairwise similarity scores. Due to the fact that $|Q|$ is used for the cosine Q, the cosine similarity scores can only range from 'zero' to 'one'. 'Zero' means that the both vectors are orthogonal. Thus, there is no similarity in the textual documents. The result 'one' signals that the document vector and the query vector point at the same direction and thus, are equal to each other. This means that there is completely overlapping textual data. In conclusion, two textual documents are more similar if the result is significantly different from zero (Hoberg and Phillips, 2016). The closer the cosine similarity score is to one, the higher the number of unique words mentioned in both disclosures.

This research uses the cosine measure to calculate within-industry similarity of the accounting policy and revenue recognition disclosures. For this purpose, the cosine measure is calculated for a firm and every other firm in the same industry. The two-digit SIC code is used for industry classification within the sample. In particular, the pairwise similarity is calculated by parsing the accounting policy and revenue recognition disclosures from the detail-tagged XBRL notes of the 10-K filings. Then a word vector is formed for each firm. This constitutes the basis for calculation of textual similarity.

During the first step, cosine measure is calculated by using the firm`s current year disclosures. This means that word-choice similarities are calculated for all pairwise firm combinations within the same two-digit (SIC) code of the same year. Hence, firm-year specific similarity vectors were used in order to make an annual pairwise comparison of disclosed notes for a firm *i* and each of its industry peers.

Then, in a second step the mean cosine measure is taken for each firm relative to all other firms within the same industry. This is required to obtain an annual firm-level similarity score. For this purpose the pairwise similarity score is collapsed into an aggregated firm-year measure by taking the arithmetic mean of all pairwise firm cosine measure combinations of each firm. This average (similarity) score is used to measure the textual similarity of a firm *i* in comparison to industry peers.

In order to gain robust results, data was only included for analysis if at least 15 observations of each two-digit SIC code and year are available. In addition, this research also uses the median similarity score in untabulated statistics. The median is generally used if there are extreme values (outliers). This is due to the fact that the arithmetic average reacts especially sensitively to those extreme values while the median is not affected thereof. The untabulated results show statistically identical results. Hence, this additional test by use of median similarity score does not change the inferences drawn in this PhD thesis.

As outlined above, the resulting similarity scores are measured by the cosine $|Q|$. It can range from 'zero' to 'one', where 'zero' would imply that the analyzed accounting policy and revenue recognition disclosures of two firms have no words in common. If the notes of two firms contain more words in common, the function calculates a higher value.

While the vector space model is a common research tool in computer science, it received only little attention by accounting research (e.g. Brown and Tucker, 2011; Peterson et al., 2015; Hoberg and Phillips, 2016). Brown and Tucker (2011) introduced this model in accounting research by analyzing changes in the MD&A section of the notes in the time series. Their research demonstrated that there are reliable arguments to adopt this approach. In particular, it can lead to the following advantages in comparability research:

(1) The vector space model is based on linear algebra, which makes it straightforward to construct and compute.

(2) The system of term weights is not binary, which allows unambiguous results.

(3) It allows ranking the documents according to the matching of words which makes it easy to implement a score system. For the scope of this research it allows to operationalize the within-industry similarity of the notes.

However, the cosine similarity measure is not without limitations. Beside the above mentioned advantages, researchers have to take the following shortcomings of the cosine similarity measure into account:

(1) The longer the disclosures are the higher the similarity scores. This is due to the fact that the text length of documents increases the probability that a word will be mentioned in both documents.

(2) There must be an exact matching between the document terms and search keywords. Due to this fact, there might be a 'false positive match' because of word substrings, which can lead to a completely different meaning of the term (Bollmann-Sdorra and Raghavan, 1998).

(3) Semantic sensitivity might lead to 'false negative match'. In particular, this is the case if there are text documents with similar context, but the precise wording is different. Then the cosine measure is not able to associate those documents due to the different term vocabulary (Hoberg and Phillips, 2016). The cosine similarity cannot account for semantics. The term semantics in the meaning of this research includes synonyms or phrases, which cannot be measured by the similarity score.

(4) The cosine measure does not consider the order of the terms in the text document. Therefore, the vector space representation might include terms even if the context in which the search keywords are used is completely different (Salton et al., 1994).

The underlying assumption of the cosine measure is that search keywords are statistically independent. The vector space model does not consider whether there is a special context of individual words within a whole phrase (Salton et al., 1994). This relationship between individual words in a phrase is called syntax. The syntax can be described as the organization of words which leads to the meaning of phrases. Identical words can describe different accounting policies within the notes. This would increase the noise of the similarity score (Hoberg and Phillips, 2016). For instance, the word "revenue" can appear in different sections of the notes. It might be related to "deferred revenue" or to "revenue recognition". Although there is a word-choice similarity, the different sections describe separate accounting items. In order to address this shortcoming, McMullin (2014) uses plagiarism detection software to measure similarity of disclosures. If two firms contain higher proportions of similar phrases, they are supposed to be more similar. In conclusion, McMullin (2014) compares a string of words instead of single words. His approach might control for the effect of different word positions within a text while the limitation regarding semantics remains persist. Therefore, McMullin's (2014) simi-

larity measure should be especially effective to measure boilerplate. However, boilerplate can also mean that firms copy the sentences from the notes of peer firms and restructure it. In these cases, the cosine similarity measure is an appropriate model since it can also analyze unstructured sentences.

Further, idioms or slangs might change the meaning of identical words. However, this should not lead to an impairment regarding the measurement of similarity in the notes since idioms or slangs are not used in these textual documents. According to McMullin (2014), words are used more homogeneous in accounting language. For instance, the word substrings described under point two are not commonly used in the notes to the accounts. There is less variety regarding the meaning of one word compared to other areas of research, e.g. marketing science. Thus, there is no impact on the results of this study through the above outlined limitations of the cosine similarity measure.

As mentioned above, the increase of cosine similarity score with the length of disclosures is a major concern of this approach. Therefore, Brown and Tucker (2011) complained about the utility of a raw cosine score. The similarity score might be less precise when analyzing big textual documents. This is due to the fact that the raw score is mechanically related with the document length and the model might lead to biased results. Consequently, longer textual documents have automatically higher similarity scores. However, this shortcoming would not cause impairment if there is no considerable variation in the length of the accounting policy and revenue recognition disclosures. This research only includes disclosures of firms within the same industry. Prior research stated that the notes of firms within the same industry are boilerplate disclosures. This in turn would suggest that the document length does not vary significantly. Indeed, the descriptive statistics in table 2 show that there is considerable variation in the document length of included notes. *WordsAccPol* varies from 2626 words at the 25th percentile to 5850 words at the 75th percentile. Also, the revenue recognition disclosures vary from 137 words at the 25th percentile to 508 words at the 75th percentile. Therefore, the effect of length must be controlled through modification of the similarity scores.

Brown and Tucker (2011) adjust for this effect by using a Taylor expansion for note length. In the course of the Taylor approximation, any function is approximated by polynomial of n-th order. Brown and Tucker (2011) calculate the expected similarity score by using a Taylor expansion at 0 for the association between raw score and length of disclosures. The number of words in disclosures determines document length. Their

modified similarity score is computed by subtracting this expected score from the raw score. In conclusion, Brown and Tucker (2011) regress the raw similarity measure on the first five polynomials of document length. In the same vein, Brown and Knechel (2016) adjust their aggregated similarity score of the notes by regressing their raw similarity measure on only the first three polynomials (Taylor-polynomial of third order) of document length. Peterson et al. (2015) use adjusted similarity scores for robustness checks in their empirical study. However, they report that this modification does not change their overall results.

In order to address the concern regarding the effect of note length, additional tests with modifications were performed in this PhD thesis. First, both scores *SimilarityAccPol* and *SimilarityRevRec* were adjusted by drawing on the approach of Brown and Tucker (2011). As explained above, expected similarity scores are calculated by adopting a Taylor expansion at 0 in order to consider document length. These expected similarity scores are subtracted from raw *SimilarityAccPol* and *SimilarityRevRec* scores. The resulting modified scores are less affected by document length. This should minimize the risk of biased results. However, all tests in this research were rerun by using raw scores. By doing so, it is ensured that the results and conclusions are not only based on this adjustment. The untabulated results from replacing the adopted similarity scores with unadjusted raw similarity scores show that there remain strong effects. Hence, the inferences drawn in this PhD thesis are not constructed through Taylor expansion for note length.

In addition, another robustness check was performed by measuring both scores *SimilarityAccPol* and *SimilarityRevRec* after filtering out all irrelevant words. For this purpose, an accounting dictionary was created in a similar way as suggested by Peterson et al. (2015). Official glossaries that cover typical vocabulary of the accounting policy and revenue recognition disclosures do not exist. Therefore, this PhD thesis includes several US accounting regulations in order to get a comprehensive set of relevant vocabulary used within the notes. These accounting regulations are listed in Appendix 1 of this research. Words which are not listed in the accounting dictionary should add no content regarding earnings quality. Accordingly, these words are not relevant for the textual analyses and were removed during the robustness check. This process controls for the effect of increasing similarity measures because of a higher number of irrelevant words. However, the untabulated results for using adjusted disclosures by excluding irrelevant

words show almost unchanged outcomes. Therefore, this robustness check does not influence or even change the overall results of this research.

Moreover, the risk of unprecise results was minimized through the combination of the cosine similarity measure with 'WordNet'. This is a lexical reference software which is online available. This system is still advancing through daily contribution of linguists. 'WordNet' organizes words into the following four groups in the form of a thesaurus: nouns, verbs, adverbs and adjectives (Miller, 1995). It provides synonym sets in English language. For instance, several nouns are classified into a group of cognitive synonyms. These are interlinked through either conceptual-semantic or lexical relations. WordNet is a common lexical tool utilized by researchers in information retrieval. It ensures that similarity of this research is precise since synonyms are considered during the process of measurement of similarity. A limitation of this approach is that the combination leads to longer runtime regarding the analysis of disclosures.

Another limitation of the cosine similarity measure is related to term weights. This is due to the fact that the model does not weight individual words. In result, each word is equally important. Therefore, term weights are an essential tool for this research to consider the importance of individual words in the notes. Common words in accounting policy and revenue recognition disclosures are downweighted while uncommon words are upweighted through a term frequency-inverse document frequency (TF-IDF) algorithm as introduced by Brown and Tucker (2011). Through this, frequently used and unimportant words should not dilute the similarity scores used in this research.

Beside the adopted weighting function TF-IDF, there are further alternative methods developed by the previous empirical research. For instance, Hoberg and Phillips (2010) removed unimportant content of 10-K filings by searching for words that are included by at least 95 percent of the analyzed documents. In another study Hanley and Hoberg (2010) controlled for unimportant standard content by using simple vector weights. These are based on a word count that is straightforward to construct and compute. However, a shortcoming of all these approaches is that only the occurrence of words is considered. In contrast, the adopted weighting function TF-IDF controls additionally for word frequency in the accounting policy and revenue recognition disclosures. The adjustments by this weighting function are explained in the following.

TF-IDF is commonly used in the research field of text mining and information retrieval. Further, it enables searching engines to provide document ranking. With regard to this research, TF-IDF is a statistically based measure in order to evaluate the importance of words in the accounting policy and revenue recognition disclosures. A word is upweighted if it appears more often in the notes. However, TF-IDF also takes the frequency of the word in the corpus into account. More frequently used words in the text document are downweighted. Thus, frequently used and unimportant words should not increase the adopted *SimilarityAccPol* and *SimilarityRevRec* scores.

In general, the calculation of TF-IDF weight can be divided into two steps. First, the term frequency (TF) needs to be calculated. This step requires counting how many times a unique word appears in the relevant text documents. However, it has to be taken into account that the length of text documents could influence this number. Therefore, the number of times a word appears (e.g. 50 times) is divided by the total amount of words (e.g. 500 words) in the relevant text document. The calculation of TF can be illustrated by the following example using the values written in parentheses above: if there would be a text document consisting of 500 words and the unique word 'deferred' appears 50 times, the TF value amounts 0.10 (= 50/500).

The second step includes the calculation of inverse document frequency (IDF). In order to compute the IDF value, the total number (e.g. 1,000) of documents in the corpus has to be counted. Then it needs to be determined how many of those text documents (e.g. 200) include the unique word. In particular, the proceeding might be explained by the following example using the values written in parentheses above: if there would be 1,000 textual documents in the corpus and the specific word 'deferred' appears in 200 of those documents, the IDF value amounts 5 (= 1,000/200). In order to get the TF-IDF weight, both calculated values (TF and IDF) needs to be multiplied. Thus, the TF-IDF weight would amount 0.50 (= 0.1 x 5).

In conclusion, words that are commonly used in the notes are weighted with zero or close to zero. Instead, a word appearing only once in the accounting policy or revenue recognition disclosures are upweighted. According to Brown and Tucker (2011), there is a risk of overweighting that can influence the adopted similarity scores. They addressed this issue by adjusting the TF approach with the stop-word list of Li (2010). This PhD thesis follows this and includes the stop-word list as illustrated in Appendix 2.

By doing so, it also draws on the approach of Peterson et al. (2015) as outlined in the following paragraph.

The study of Peterson et al. (2015) addressed the concern of frequently and unimportant words in the analyzed disclosures. They controlled for this effect by removing stop words from accounting policy disclosures. Stop words would comprise words such as "and", "the", "will" or "because". They also conduct this process for stemming words. During this process typical suffixes like "s", "ed", "ing", "ion" are removed in order to abstract from word tense (Peterson et al. 2015, p. 11). Otherwise, there might be a risk that these stop words, stemming words and typical suffixes influence the empirical results (Manning and Schütze, 1999). Stemmer and stop words are not important for the analysis of similarity of the accounting policy and revenue recognition disclosures. Therefore, these words were removed by following the study of Peterson et al. (2015).

A big advantage in using the mean cosine measure is that a researcher does not have to make difficult case-by-case decisions, such as which accounting policies to focus on and how to account for variations across firms, as argued by Fields et al. (2001) and De Franco et al. (2011). In order to proxy for similarity of the notes to the accounts, focusing on similar individual word choices can abstract from these challenges. In conclusion, this model allows to operationalize textual similarity.

Overall, this research argues that the textual similarity scores based on individual word-choice similarities should be well suited for capturing similarity of the notes between firms within the same industry. This is despite the fact that the use of this measure has some caveats. As outlined above, a major concern is that the cosine similarity increases with disclosure length. However, this PhD thesis regresses out this effect by using a Taylor expansion for note length as in Brown and Tucker (2011).

5.3 Proxies for Earnings Management and Accounting Comparability

Beside the calculation of |Q| as correlation in order to measure textual similarity of the notes, it is also required to proxy for earnings management. The following section explains the regression analysis. Further, it introduces several models to proxy for earnings management which were taken into account to conduct this research.

In general, the regression analysis aims to approximate the actual values as accurately as possible by the use of relevant independent variables. The regression analysis can

also be illustrated in a visual way by determination of a straight line which approximates as close as possible to the point cloud of actual values. This straight line is specified through the intercept and the slope. The calculation of regression coefficients is based on ordinary least squares method.

This research analyzes the empirical association between within-industry similarity of the notes and proxies for earnings quality. However, it must be taken into account that there are multiple aspects of disclosure quality (Dechow et al., 2010). Consequently, there are also various proxies to measure earnings quality. However, similarity of the notes should not be correlated with all earnings management proxies. Hence, the analysis only includes proxies that are expected to be affected by the similarity of the notes.

Following many previous studies, abnormal levels of total accruals are used as a proxy for accrual-based earnings management. These abnormal accruals are measured using the cross-sectional modified Jones Model for each industry-year as proposed by Dechow et al. (1995) and Cohen et al. (2008). It has to be considered that this model is only applicable if at least 15 observations of each two-digit SIC code and year are available. As opposed to Cohen et al. (2008), an intercept is included in the model. Moreover, Kothari et al. (2005) suggest that including an intercept can help in controlling for heteroscedasticity, as well as mitigate concerns about an omitted size variable, see Kothari et al. (2005) for further explanation.

The abnormal accruals are also known as discretionary accruals. In particular, these are the total reported accruals divided by lagged total assets less the fitted values by using model (1) to proxy for normal levels of accruals. Normal levels of accruals are measured as follows:

(1)

$$\frac{TA_{i,t}}{A_{i,t-1}} = \beta_0 + \beta_1 \frac{1}{A_{i,t-1}} + \beta_2 \frac{\Delta REV_{i,t} - \Delta REC_{i,t}}{A_{i,t-1}} + \beta_3 \frac{PPE_{i,t}}{A_{i,t-1}} + \varepsilon_{i,t}$$

where for fiscal year t and firm i, *TA* is calculated as net income before extraordinary items less cash flow from operations. *A* is total assets, where *PPE* denotes gross property plant and equipment and ΔRev-ΔRec represents changes in cash revenues from the preceding year (changes in total revenues less changes in accounts receivables). Throughout this paper, unsigned discretionary accruals are used as a proxy for accrual-based earnings management. This is due to the fact, that a certain direction of managed

accruals cannot be expected since there are various ways offered under US GAAP to manage the accruals either upwards or downwards (Ronen and Yaari, 2008). Further, accruals reverse over time. According to McNichols (2000), accounting information quality measured by similarity of accounting policy disclosures may reduce both income increasing and decreasing earnings management behaviour of firms.

The proxies for real earnings management are developed similar to Roychowdhury (2006). Following Zang (2012), overproduction of inventory in order to report lower costs of goods sold and reducing discretionary expenses are considered as tools for real earnings management by firms. In order to decompose normal levels and abnormal levels of production costs, the following equation (2) is measured, as suggested by Roychowdhury (2006):

(2)

$$\frac{Prod_{i,t}}{A_{i,t-1}} = \beta_0 + \beta_1 \frac{1}{A_{i,t-1}} + \beta_2 \frac{Rev_{i,t}}{A_{i,t-1}} + \beta_3 \frac{\Delta Rev_{i,t}}{A_{i,t-1}} + \beta_4 \frac{\Delta Rev_{i,t-1}}{A_{i,t-1}} + \varepsilon_{i,t}$$

where for fiscal year t and firm i, $Prod$ refers to production costs as the sum of cost of goods sold and changes in inventories from the preceding year. A denotes total assets. Rev is total revenues, and ΔRev is defined as changes in total revenues from the preceding year. Abnormal production costs are measured cross-sectionally for each industry-year combination of at least 15 observations. Industries are defined by two-digit SIC codes.

Abnormal levels of discretionary expenses (*Abdisx*) are the difference between actual reported discretionary expenses and their estimated normal levels as shown in model (3). These normal levels are calculated cross-sectionally, in adaptation of Roychowdhury (2006) and Zang (2012) if at least 15 observations for each industry-year are available. In particular, the normal levels were calculated as follows:

(3)

$$\frac{Disx_{i,t}}{A_{i,t-1}} = \beta_0 + \beta_1 \frac{1}{A_{i,t-1}} + \beta_2 \frac{Rev_{i,t-1}}{A_{i,t-1}} + \varepsilon_{i,t}$$

where for fiscal year t and firm i, $Disx$ is the sum of R&D expenses, SG&A expenses and advertising expenses. Due to data limitations, advertising expenses were set to zero if missing. A is total assets and Rev represents total revenues.

Following prior literature (Zang, 2012), the abnormal level of discretionary expenses *Abdisx* is multiplied by minus one so that higher amounts of discretionary expenses indicate higher magnitudes of income-increasing real earnings management. Since firms might use a range of real earnings management methods, both individual real earnings management proxies are aggregated to obtain a single real earnings management proxy.

Furthermore, the firm-year accounting comparability score introduced by De Franco et al. (2011) is employed to validate the similarity scores of accounting policy and revenue recognition disclosures. In general, the degree to how similar firms translate economic performance measured by stock returns into accounting numbers proxied by earnings is the basis for their comparability measure. First, De Franco et al. (2011) estimate the following regression (4) for the prior 16 quarters:

(4)

$$Earnings_{it} = \alpha_i + \beta_i Return_{i,t} + \varepsilon_{i,t}$$

where for fiscal quarter *t* and firm *i*, *Earnings* represents the ratio of quarterly net income before extraordinary items to the beginning-of-period market value of equity, and *Return* is the stock price return during the quarter *t*. In contrast to the above described models, the following mathematical formulae (5) and (6) allow measurement in the cross-section. Thus, the following formulae differentiate between firm i and firm j by using α and β as the regression coefficients. With the obtained estimates of intercept α and slope coefficient *β*, they estimate the comparability of each firm pair by predicting firm *j*'s earnings using firm *i*'s returns (De Franco et al., 2011).

(5)

$$E(Earnings_{iit}) = \hat{\alpha}_i + \hat{\beta}_i Return_{i,t}$$

(6)

$$E(Earnings_{ijt}) = \hat{\alpha}_j + \hat{\beta}_j Return_{i,t}$$

while the mathematical formula (6) compares firm i and firm j, De Franco et al. (2011) used formula (5) for control purposes. Finally, the results of both formulae are compared through subtraction as modeled by (7). The comparability between two firms is measured over the previous 16 quarters as follows:

(7)

$$CompAcct_{ijt} = -\frac{1}{16} \sum_{t-15}^{t} \left| E(Earnings_{iit}) - E\big(Earnings_{ijt}\big) \right|$$

If there are results for two firms being more comparable, the difference between the two predicted earnings of firm *i* and *j* for the same set of economic events is smaller. Based on this pairwise accounting comparability measure, De Franco et al. (2011) also produce a firm-year comparability score by aggregating and calculating the mean value of *CompAcct* for all pairwise combination within the same two-digit SIC code and year for each firm. As seen in model (7), De Franco et al. (2011) multiply their firm-year comparability measure by minus one so that higher values indicate greater accounting comparability. The aggregated mean comparability score *Ind_acctcomp* is utilized, since the similarity scores of the notes are similarly measured by taking the arithmetic mean of all pairwise firm cosine measure combinations for each firm in the same industry-year. This research obtained *Ind_acctcomp* from Rodrigo S. Verdi's website and matched it with the sample. There is a free data access and the information is available under http://www.mit.edu/~rverdi/.

De Franco et al. (2011) used a univariate analysis in their empirical part. In particular, they performed preliminary benchmark tests for their accounting comparability measure. In order to examine if there is an impact on the firm's earnings, they focused on the quality, predictability and smoothness of earnings. The results of De Franco et al. (2011) show a significant relation between their adopted comparability measure and a profit or loss in the financial reporting. Hence, they conclude that there is a correlation of their measure with the firm's performance. However, according to the previous research, the results of De Franco et al. (2011) could also be caused through the characteristics of the earnings response coefficients. The study of Hayn (1995) found out that the earnings response coefficients are related to reporting of a profit or loss. There are further studies pointing out similar associations. For example, Kormendi and Lipe (1987) state that predictability is associated with earnings response coefficients. According to Bushman et al. (2016), accrual quality is related with earnings response coefficients. None of these researchers conducted a comparability study to explore the association between these characteristics of earnings quality and earnings response coefficients. Therefore, it remains uncertain if the earnings attribute results calculated by De Franco

et al. (2011) are caused through comparability or if these are related to previous research findings.

In conclusion, this research recognizes that there may be an empirical association between within-industry similarity of the notes and proxies for earnings quality. By drawing on Dechow et al. (2010), it is taken into account that there are multiple aspects of earnings quality. The similarity of the notes should not be correlated with all earnings management proxies. Hence, the analysis only includes proxies that are expected to be affected by the similarity of the notes. For instance, abnormal levels of total accruals are used as a proxy for accrual-based earnings management. More similar notes across firms within the same industry should lead to less variation of accruals. This is due to the fact that the accounting should be similar across firms within the same industry and extreme estimates are related to lower earnings quality. The adopted proxy attempts to measure abnormal performance or variation. By following Roychowdhury (2006), abnormal levels of production costs and discretionary expenses were used to measure real earnings management. These included proxies cover various activities of a firm. They can be described as summary measures which is important for exploring similarity of the full set of accounting policy and revenue recognition disclosures. Accruals and earnings items are explained in the "Variable descriptions" included as Appendix 3.

5.4 Data and Sample

Accounting policy and revenue recognition disclosures were obtained from XBRL-tagged 10-K filings from the SEC EDGAR database for the sample period 2011-2015. Large accelerated filers using U.S. GAAP were obliged to tag their notes as a block of text for all fiscal periods ending on or after June 15, 2009 (SEC, 2009). Therefore, XBRL-formatted notes are available from 2009.

In addition, the SEC required publicly listed firms to detail tag significant accounting policies over a phased implementation period. The exact date depended on the firm's SEC filing status that is based on company size. With regard to the extent of this enlargement, it required tagging and detail tagging of significant accounting policies, such as revenue recognition disclosures. Large accelerated filers were obligated to fulfill this requirement in the second year of their respective XBRL adoption (SEC, 2009). Thus, detailed XBRL-tagged notes are available with a one-year delay up from 2010.

The analyses begin with the year 2011 in order to ensure that all sample firms are subject to the detailed tagging requirement by the SEC. This allows to focus on different sections of the notes. Additionally, data was obtained for the years 2006-2010 in order to calculate the control variables volatility of revenues *|StdSales|* and operating cash flows *|StdOpCF|* for the prior five years. For an inclusion of SEC filings to the sample, data about every control variable must be available. Due to data limitations and different test specifications, this does not apply for accrual-based and real earnings management proxies, as well as De Franco et al.'s (2011) accounting comparability measure.

In order to identify the relevant industry of a firm, two-digit SIC codes are used. The SEC filing system specifies the particular industry of a firm according to a two-digit SIC code (Bartov and Konchitchki, 2017). This categorization enables researchers to analyze the within-industry similarity and to compare financial statements across certain industries. Data of a particular industry was only included if at least twenty firms of each industry-specific SIC code were available.

Python programming language was used in order to obtain the notes from the SEC index files (Ashraf, 2017). Subsidiaries and industries with less than 15 observations of each year were removed. The subsidiaries were identified according to data gained through Audit Analytics. Previous research showed that the use of Python programming language can lead to errors (Peterson et al., 2015). In order to reduce the risk of measurement error of the used proxy, several tests were performed. In particular, the longest and shortest 500 disclosures were manually checked. If necessary, these disclosures were fixed to correct any programming errors. In case of abnormally short or long disclosures, the observations were excluded. For instance, observations where the word count in the accounting policy disclosures was below 200 words were excluded from the sample. Further, observations where the relation of word count between the accounting policy disclosures and the total length of the notes exceeded 80 percent were removed from the sample. In addition, the accuracy of the Python-extracted notes was tested in a final manual test. First, a random sample of 200 notes was manually selected and downloaded from SEC EDGAR. Then this manual sample was directly compared with the Python-extracted notes. With regard to the text length, the untabulated results of this test show a correlation of 0.95 between the manual sample and the Python-extracted notes. Hence, the use of Python to obtain detail-tagged XBRL notes leads to accurate data for this research.

It is essential that the statistical results allow to generalize the findings to a certain degree (Pallant, 2016). This ensures the significance of conclusions and the contribution to the literature. Therefore, this research aimed to include a large amount of data of firms across different industries and also distressed companies. Thus, the included detail-tagged XBRL filings cover 9 industries. The origin sample size was 9761 firm-year observations of the notes to the accounts. There is the following ranking concerning the number of XBRL-formatted SEC filings of the relevant industry groups (see section 6.1):

(1) Primary Metal Industry (SIC 33),

(2) Chemicals and Allied Products (SIC 28),

(3) Eating and Drinking Places (SIC 58),

(4) Hotels, Rooming Houses and Camps (SIC 70),

(5) Industrial and Commercial Machinery and Computer Equipment (SIC 35),

(6) Automotive Repair, Services and Parking (SIC 75),

(7) Business Service (SIC 73),

(8) Oil and Gas Extraction (SIC 13), and

(9) Bituminous Goal and Lignite Mining (SIC 12).

Following prior literature, firms in the financial industries (SIC code 6000-6999) and firms in regulated industries (SIC 4400-5000) were excluded. This is due to the fact that firms in the financial industries and firms in the regulated industries are governed by different accounting rules.

The final sample also excluded observations in which the two-digit SIC code is missing in Capital IQ. In addition, further submissions were eliminated because of missing values in Capital IQ database.

In the final sample, only data is included, where one of the two similarity scores, their lagged values, and every control variable are available. After applying the above-mentioned sample criteria, the final sample data of this research comprise 1447 firm-year observations of the notes to the accounts of 817 unique firms (see section 6.1).

As mentioned above, the data sample includes only large accelerated firms. According to Section 240 Rule 12b-2 of Exchange Act, "[t]he term large accelerated filer means an issuer after it first meets the following conditions as of the end of its fiscal year:

(1) The issuer had an aggregate worldwide market value of the voting and non-voting common equity held by its non-affiliates of $700 million or more, as of the last business day of the issuer's most recently completed second fiscal quarter;

(2) The issuer has been subject to the requirements of section 13 (a) or 15 (d) of the Act for a period of at least twelve calendar months;

(3) The issuer has filed at least one annual report pursuant to section 13 (a) or 15 (d) of the Act; and

(4) The issuer is not eligible to use the requirements for smaller reporting companies in part 229 of this chapter for its annual and quarterly reports."

Consequently, generalization to firms which are smaller and not publicly-traded may not be appropriate. However, the financial statements of large accelerated firms submitted to the SEC are expected to provide reliable research findings. The risk of random errors should be minimized since such firms have high qualified accountants and the financial statements are regularly subject to external audits.

As mentioned above, this research uses XBRL-formatted notes from SEC EDGAR database. A big advantage of XBRL is that the data is not aggregated. In contrast to other data sources, e.g. Compustat, the information is truly presented "as reported" or filed by the firm with the SEC. Hence, there is no risk of biased information or a lack of information through subjective aggregation (Hoitash et al., 2018). As a comparison, there is a limitation to a maximum of 776 financial statements items in Compustat. The XBRL filings can include around 7000 financial statements items. Moreover, XBRL allows to analyze large amounts of data in a standardized manner since it is machine-readable.

6 Data Analysis and Results

This chapter presents and discusses the statistical results of the conducted data analysis. First, it validates the adopted similarity scores. Then the effect of more similar notes is tested on both accrual-based and real earnings management.

6.1 Descriptive Statistics

Table 2 below provides important statistics about all variables used in this study. Variables with *Adj* suffixes are calculated as the difference of the variable for the specific firm and its industry-year median. All variables except *SimilarityAccPol*, *SimilarityRevRec*, *Ind_acctcomp*, logarithmized variables like *Size* and note length variables as well as binary variables such as *BigFour*, and *SpecialistAuditor* are annually winsorized at 1 and 99 percentiles. By following the previous research, this is done to mitigate the effects of outliers on inferences drawn in the thesis (Peterson et al., 2015).

The following illustrated table 2 reports descriptive statistics for all variables used in the data analysis. Each variable and its measurement are explained in more detail in the "Variable descriptions" included as Appendix 3 to this research.

Table 2: Descriptive statistics

Variable	N	Mean	Median	Std. Dev.	p25	p75
SimilarityAccPol	1447	0.202	0.198	0.025	0.174	0.209
SimilarityRevRec	1447	0.157	0.153	0.028	0.138	0.175
Ind_acctcomp	1447	-3.974	-3.365	2.374	-4.370	-2.640
AbsDAC	1447	0.153	0.079	0.231	0.037	0.186
REM	1447	0.125	0.138	0.569	-0.118	0.382
Abprod	1447	-0.005	0.009	0.197	-0.108	0.102
Abdisx	1447	0.160	0.156	0.488	-0.013	0.318
|UnusualLengthAccPol|	1447	0.380	0.307	0.341	0.138	0.651
LengthAccPol	1447	8.371	8.436	0.637	8.011	8.829
WordsAccPol	1447	4437.271	3981.516	2372.306	2626.041	5850.537
|UnusualLengthRevRec|	1447	0.648	0.541	0.514	0.241	0.955
LengthRevRec	1447	5.642	5.603	0.957	4.958	6.283
WordsRevRec	1447	420.014	259.537	443.827	137.133	508.408
TAS	1447	6608.237	970.815	22700.000	147.142	4156.326
Size	1447	6.980	7.375	2.791	5.163	8.944
SizeAdj	1447	1.103	1.297	2.794	-0.709	3.007
|SizeAdj|	1447	2.480	2.196	1.721	1.113	3.515
RoA	1447	-0.034	0.051	0.370	-0.017	0.097

RoAAdj	1447	0.001	0.034	0.395	-0.025	0.110
|RoAAdj|	1447	0.196	0.078	0.365	0.030	0.192
BTM	1447	0.534	0.481	0.694	0.263	0.799
BTMAdj	1447	0.108	0.056	0.671	-0.145	0.364
|BTMAdj|	1447	0.457	0.238	0.749	0.103	0.477
Leverage	1447	0.239	0.181	0.300	0.028	0.320
LeverageAdj	1447	0.055	0.000	0.291	-0.102	0.126
|LeverageAdj|	1447	0.167	0.107	0.246	0.057	0.181
CapInt	1447	0.231	0.161	0.207	0.081	0.319
CapIntAdj	1447	0.037	0.011	0.135	-0.045	0.105
|CapIntAdj|	1447	0.101	0.067	0.103	0.028	0.134
OpCycle	1447	135.064	114.452	101.530	75.046	162.507
OpCycleAdj	1447	19.923	0.000	87.692	-24.994	36.476
|OpCycleAdj|	1447	50.746	28.727	76.058	11.897	57.479
CCC	1447	72.077	68.244	114.627	31.275	115.854
CCCAdj	1447	2.521	0.479	102.371	-25.650	37.039
|CCCAdj|	1447	60.394	30.861	98.871	12.040	64.836
StdSales	1447	0.192	0.132	0.194	0.076	0.229
StdSalesAdj	1447	0.040	-0.011	0.187	-0.067	0.071
|StdSalesAdj|	1447	0.110	0.067	0.158	0.032	0.112
StdOpCF	1447	0.084	0.045	0.135	0.026	0.082
StdOpCFAdj	1447	0.008	-0.013	0.131	-0.038	0.017
|StdOpCFAdj|	1447	0.064	0.029	0.116	0.013	0.054
SalesGrowth	1447	0.100	0.073	0.277	-0.015	0.185
SalesGrowthAdj	1447	0.022	-0.003	0.268	-0.080	0.094
|SalesGrowthAdj|	1447	0.161	0.088	0.221	0.037	0.184
Zscore	1447	2.074	3.023	9.071	1.786	4.696
ZscoreAdj	1447	-0.643	0.360	9.007	-0.884	2.005
|ZscoreAdj|	1447	4.027	1.353	8.811	0.547	3.326
BigFour	1447	0.758	1.000	0.474	0.000	1.000
SpecialistAuditor	1447	0.282	0.000	0.461	0.000	1.000

As shown in the second column of table 2, the sample includes 1447 (N=1447) firm-year observations of detail-tagged accounting policy and revenue recognition disclosures in XBRL format. The *SimilarityAccPol* and *SimilarityRevRec* can range between 'zero' and 'one'. The closer the similarity scores are to 'one', the higher the number of unique words. The means of accounting similarity scores for the full set of accounting policies and revenue recognition are 0.202 and 0.157. In comparison to the similarity score of accounting policies reported in Peterson et al. (2015, p. 47), the means in this research are smaller. They calculated a mean of 0.510 for their sample size. However, they do not use a measurement that is based on word-choice similarities. Therefore, the

results reported in the study of Peterson et al. (2015) cannot be directly compared with the descriptive statistics of this research.

There is some variation regarding the within-industry similarity. This is due for both similarity scores. *SimilarityAccPol* varies from 0.174 at the 25th percentile to 0.209 at the 75th percentile. The second similarity score *SimilarityRevRec* varies from 0.138 at the 25th percentile to 0.175 at the 75th percentile. However, with a standard deviation of 0.025 *(SimilarityAccPol)* and 0.028 (*SimilarityRevRec*), the variation of both disclosure scores is quite similar. The average log of accounting policy and revenue recognition disclosures is 8371 (4437 words) and 5642 (420 words), respectively. On average, revenue recognition disclosures add up to 9.47 percent of the full set of accounting policy disclosures in the sample. This demonstrates the importance of the item revenue recognition within the whole complex of accounting policies.

The average of unsigned discretionary accruals seems to be quite high, with 15.3 percent of lagged total assets. The standard deviation of 23.1 percent indicates that variations of discretionary accruals are quite large within industries and years in the sample. Given the distributions of the control variables, the average leverage per firm amounts to 23.9 percent of total assets. This low average indicates that the majority of included firms have a high proportion of equity capital. Moreover, it demonstrates that financial distress is not a major concern of the average sample firm. The operating cycle is roughly 135 days and the book-to-market-ratio is 0.534 in average. Overall, this demonstrates that the average sample firm has a stable economic environment and growth rate. Further, the descriptive statistics show that an average of 75.8 percent of the sample firms are audited by one of the Big Four auditors. This significant value indicates reliable data since extant studies commonly utilized auditor size to assess audit quality (DeFond and Zhang, 2014). On average, 28.2 percent of analyzed firms employ an industry-specific specialist auditor. This is defined as auditors with the most conducted audits within the same two-digit SIC code and year in the sample of this research. The high average value of almost one third indicates an increased level of audit quality by auditors with industry expertise.

With regard to the distribution of the sample used in this study, it must be taken into account that the within-industry similarity of the notes of firms across 9 industries is analyzed. This means that the above mentioned 1447 XBRL firm-years covers 9 different industries. Table 3 below presents the distribution of the sample according to two-

digit SIC code. As outlined in section 5.4, only large accelerated filers of the distinct industries are included. This is due to the fact that these firms are required to detail tag tables, explanations of reported figures and significant accounting policies since the year 2010 (SEC, 2009). The following table provides an overview about the firm-year observations and the number of firms that are qualified as large accelerated filers across the 9 industries that are subject to this analysis.

Table 3: Distribution of the sample according to two-digit SIC code

Two-digit SIC	Industry description	Firm-year observations	Large accelerated filers
(SIC 12)	Bituminous Goal and Lignite Mining	17	25
(SIC 13)	Oil and Gas Extraction	21	23
(SIC 28)	Chemicals and Allied Products	305	381
(SIC 33)	Primary Metal Industry	419	457
(SIC 35)	Industrial and Commercial Machinery and Computer Equipment	146	202
(SIC 58)	Eating and Drinking Places	251	290
(SIC 70)	Hotels, Rooming Houses and Camps	193	238
(SIC 73)	Business Service	39	51
(SIC 75)	Automotive Repair, Services and Parking	56	74

As illustrated in table 3, there are the most firm-year observations for the primary metal industry (419 detail-tagged XBRL filings). Also, the highest number of firms which are categorized as large accelerated filers belong to the primary metal industry. The maximum of 457 firms is followed by the chemicals and allied products industry where 381 large accelerated filers are available to conduct this study. However, it must be taken into account that the SEC filings of firms were only included if data about every variable and control variable was available (see section 5.4).

Further, table 3 above shows that the SEC requirement led to 305 detail-tagged filings in the chemicals and allied products industry, followed by (251 detail-tagged XBRL filings for) the SIC 58 firms which includes eating and drinking places. The sample distribution presented in table 3 above is beneficial in two ways. First, it provides an overview about the number of included XBRL firm-year observations from each distinct industry. Second, it proves that the results from the empirical analysis explained in the remainder of this chapter are not only based on the data of one specific industry. Instead, an appropriate number of observations from 9 industries is used to examine the within-industry similarities of accounting policy and revenue recognition disclosures.

This in turn ensures that the adopted research approach can fully explain the relationship between similarities of the notes and earnings quality. Otherwise, there would remain a risk that the findings are based on the individual disclosure behaviour of one specific industry. In conclusion, the diversity by the within-industry similarity scores of the notes from 9 industries provides additional validation for the research results.

The descriptive statistics in table 2 do not present how much customized extensions and standardized tags are used in the notes of the sample firms. This is due to the fact that this PhD thesis only includes large accelerated filers. The detailed tagging requirements by the SEC apply to these firms since the year 2010. Therefore, all sample firms were obligated to detail tag their XBRL notes during the entire sample period. To validate the limitation of this research to large accelerated firms, the usage of extensions among SEC filers during the periods 2011 till 2015 is examined in the following. As explained above, firms are subject to the detailed tagging requirements by the SEC beginning in the second year of their respective XBRL adoption (SEC, 2009). This means that all SEC filers, which includes the non-accelerated filers, are required to detail tag significant accounting policies up from 2012 at latest.

Figure 9: Number of used standardized and extension tags
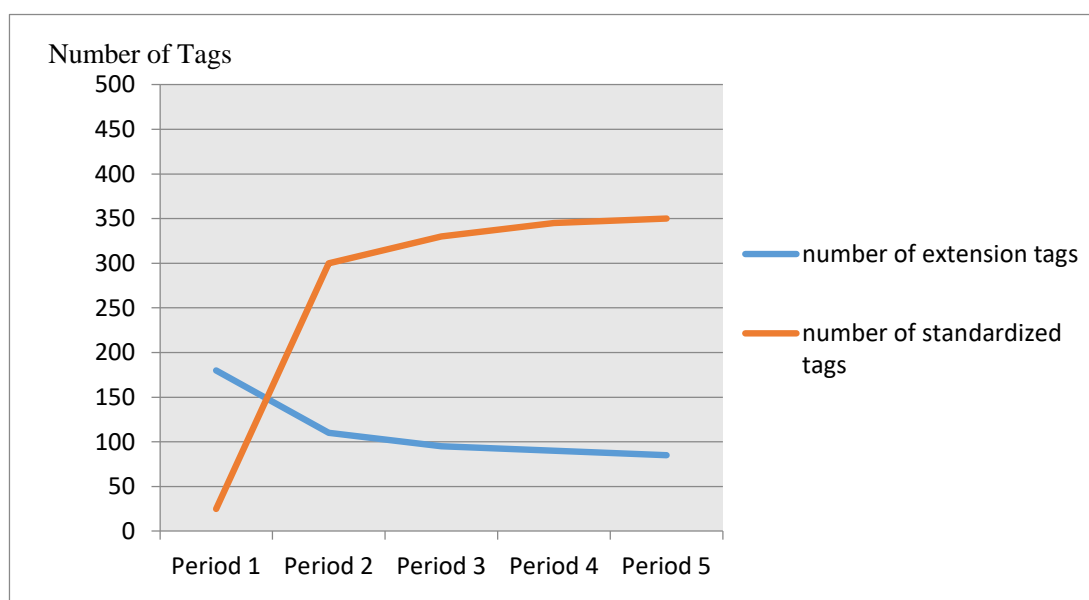
Figure 9 above shows the average number of used extensions and standardized tags per SEC filer during the period from 2011 to 2015. Both lines in the figure illustrate the fact that non-accelerated filers were longer allowed to submit block tagged filings instead of detail-tagged notes. There is a significant reduction of the average number of custom-

ized extensions in the second period when the detailed tagging requirements fully apply to all SEC filers. Also, the usage of standardized tags increased from 2011 to 2012 by an average number of 275 tagging elements. This demonstrates the extent to which the detailed tagging requirements improve the standardization of firm-specific information in the notes to the accounts. As outlined in section 2.4, the use of standardized tags increases the comparability of information. Further, there is a second rationale for the limitation of data set to large accelerated filers beside the increased usage of standardized tags. This refers to the shortcoming that there are more missing values in the SEC filings of non-accelerated firms compared to those of large accelerated ones. Therefore, detail-tagged notes of large accelerated SEC filers provide appropriate data to explore the within-industry similarities of accounting policy and revenue recognitions disclosures.

6.2 Multicollinearity

Multicollinearity issues occur in case of a high correlation between two or more variables. According to Tabachnick and Fidell (1996), Pearson pairwise correlation is an appropriate test for multicollinearity that is commonly used in empirical research. Table 4 illustrated below reports the Pearson pairwise correlations. Significant correlations at the 5 percent level (two sided) are marked in bold. By following many previous studies, multicollinearity should not affect the results of this PhD thesis if the bivariate correlation for each pair of variables is less than 0.7 (Tabachnick and Fidell, 1996). If there is a higher bivariate correlation for a pair of variables, it is required to exclude one of the both variables in order to avoid any multicollinearity concerns. The variables are defined in Appendix 3.

Table 4: Pearson correlation matrix

Variables	Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
SimilarityAccPol	(1)													
SimilarityRevRec	(2)	**0.47**												
Ind_acctcomp	(3)	0.00	**0.10**											
AbsDAC	(4)	**-0.13**	**-0.15**	**-0.16**										
REM	(5)	**-0.12**	**-0.18**	**0.05**	**-0.11**									
Abprod	(6)	**-0.07**	**-0.09**	**-0.03**	**-0.04**	**0.57**								
Abdisx	(7)	**-0.11**	**-0.17**	**0.10**	**-0.09**	**0.94**	**0.18**							
LengthAccPol	(8)	**-0.09**	**-0.08**	-0.07	**-0.04**	0.02	0.02	0.03						
LengthRevRec	(9)	**-0.13**	**-0.29**	-0.09	-0.03	**-0.12**	**-0.05**	**-0.09**	**0.21**					
|UnusualLengthAccPol|	(10)	**-0.09**	**-0.07**	**0.10**	0.02	**0.08**	-0.04	**0.07**	**-0.18**	0.12				
|UnusualLengthRevRec|	(11)	**-0.03**	**-0.05**	-0.04	**0.04**	0.02	-0.03	**0.08**	**0.09**	0.08	0.11			
Size	(12)	**0.15**	**0.19**	**0.26**	**-0.29**	**0.08**	-0.04	**0.10**	**0.16**	**0.11**	**0.04**	**-0.04**		
RoA	(13)	**0.07**	**0.09**	**0.31**	**-0.39**	**0.16**	**-0.07**	**0.24**	0.03	0.00	0.01	-0.01	**0.27**	
BTM	(14)	-0.04	-0.07	**-0.07**	**-0.18**	**0.12**	**0.12**	**0.08**	0.03	-0.01	0.01	-0.01	**-0.04**	**0.26**
Leverage	(15)	-0.06	**-0.14**	**-0.15**	**0.21**	-0.05	0.00	-0.03	**-0.09**	**-0.15**	0.03	-0.04	**-0.16**	**-0.35**
CapInt	(16)	**0.09**	**-0.07**	-0.03	**-0.17**	**0.19**	**0.10**	**0.18**	**-0.09**	**-0.21**	0.02	**-0.11**	**0.15**	**0.11**
CCC	(17)	**-0.08**	-0.05	0.03	**-0.15**	**0.11**	-0.05	**0.12**	-0.04	**0.06**	**0.07**	0.01	0.01	**0.19**
StdSales	(18)	**-0.10**	**-0.14**	**-0.16**	**0.27**	**-0.15**	0.00	**-0.10**	**-0.07**	-0.03	-0.02	-0.03	**-0.31**	**-0.23**
StdOpCF	(19)	**-0.11**	**-0.12**	**-0.21**	**0.35**	**-0.17**	-0.02	**-0.19**	**-0.05**	0.07	-0.01	**0.04**	**-0.33**	**-0.59**
SalesGrowth	(20)	0.00	0.02	**0.05**	0.03	**-0.12**	0.03	**-0.17**	0.00	0.01	0.04	0.00	**0.07**	**0.05**
Zscore	(21)	0.05	**0.09**	**0.29**	**-0.38**	**0.10**	-0.01	**0.15**	0.00	0.02	0.05	-0.05	**0.31**	**0.64**
BigFour	(22)	**0.14**	**0.18**	**0.11**	**-0.27**	**0.05**	**0.05**	**0.09**	**0.12**	**0.10**	**0.04**	-0.01	**0.71**	**0.38**
SpecialistAuditor	(23)	**0.10**	**0.09**	0.05	**-0.15**	-0.07	0.03	-0.04	**0.07**	0.00	0.03	0.00	**0.20**	**0.13**

Variables	Column	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
SimilarityAccPol	(1)									
SimilarityRevRec	(2)									
Ind_acctcomp	(3)									
AbsDAC	(4)									
REM	(5)									
Abprod	(6)									
Abdisx	(7)									
LengthAccPol	(8)									
LengthRevRec	(9)									
|UnusualLengthAccPol|	(10)									
|UnusualLengthRevRec|	(11)									
Size	(12)									
RoA	(13)									
BTM	(14)									
Leverage	(15)	**-0.43**								
CapInt	(16)	**0.10**	**0.14**							
CCC	(17)	**0.23**	**-0.27**	**-0.30**						
StdSales	(18)	**-0.12**	**0.12**	**-0.15**	**-0.18**					
StdOpCF	(19)	**-0.25**	**0.29**	**-0.15**	**-0.23**	**0.41**				
SalesGrowth	(20)	**-0.08**	0.00	0.00	**-0.05**	-0.02	**0.10**			
Zscore	(21)	**0.33**	**-0.57**	**0.08**	**0.29**	**-0.23**	**-0.46**	**0.12**		
BigFour	(22)	-0.02	**-0.09**	**0.15**	0.04	**-0.22**	**-0.38**	0.06	**0.31**	
SpecialistAuditor	(23)	-0.01	-0.04	**0.07**	0.03	**-0.15**	**-0.11**	0.04	**0.13**	**0.35**

Overall, table 4 shows correlations less than 0.7 for each combination. As expected, the correlation matrix shows that both similarity scores are positively correlated with each other (with a correlation of 0.47). The significant correlation relates to the fact that revenue recognition disclosures are an inherent part of the full range of accounting policies. The revenue recognition disclosures contain specific information about a firm's future earnings. Further, both similarity scores of the notes are also significantly correlated with the majority of included control variables (with Pearson correlations between -0.57 and 0.33). The correlations are all below 0.7 implying that there is only minor overlap between both similarity scores and the various control variables. Nevertheless, the positive correlations with the variables *BigFour* (with correlations of 0.14 and 0.18) and *Specialist Auditor* (with correlations of 0.10 and 0.09) support the reasoning that audit quality leads to more similar notes to the accounts. This will be analyzed in more detail during the following validation test (see table 6).

Moreover, both similarity scores the full set of accounting policy and revenue recognition disclosures are negatively correlated with disclosure length. In this context, it is important to address the limitation that cosine similarity measure automatically increases with document length. This PhD thesis controls for this effect by using a Taylor expansion for note length (see section 5.2). As shown in table 4, there is a correlation of -0.09 for the full set of accounting policy disclosures and -0.29 for the text length of revenue recognition disclosures. This demonstrates the negative effect of document length on the similarity of the notes. Hence, the test illustrated in section 6.4 will analyze if document length and abnormal length of disclosures impair the similarity of the notes.

Moreover, table 4 shows a positive correlation of 0.10 between similarity of the revenue recognition disclosures and the output-based comparability measure *Ind_acctcomp*. The significant correlation indicates that the similarity in certain sections of the notes captures accounting comparability. Yet there seems to be no clear pattern between the accounting comparability measure and the full set of accounting policies disclosures. The findings by Peterson et al. (2012, p. 22) suggest that similarity of the notes and the output-based comparability score "[…] capture different aspects of accounting comparability". Moreover, Brown and Knechel (2016) find similar results. They analyzed a reference group only containing firms of the same auditor within the same industry and year. However, all of those previous studies compare the entire range of disclosures across

firms. In contrast, this research examines different parts of the notes. Finally, this PhD thesis cannot draw inferences from previous studies, because of the different way their similarity score is calculated. Therefore, this research infers from the finding that there seems to be no clear pattern between the accounting comparability measure and the full set of accounting policies disclosures the following: It has to be taken into account that similarity in different areas of the notes might explain different attributes and outcomes of accounting. Hence, a more granular approach by analyzing different parts of the notes seems warranted. The relation between these measures will be further investigated in section 6.4.

In addition, the correlation matrix in table 4 shows that both similarity scores of the notes are negatively related to unsigned discretionary accruals. There are significant correlations of -0.13 for *SimilarityAccPol* and -0.15 for *SimilarityRevRec*. These results support the first hypothesis of this research that firms with similar accounting policy and revenue recognition disclosures conduct less accrual-based earnings management. Further, the correlations show the relevance of both information sources for capturing earnings quality. In the main part of this study, their relation will be analyzed in more detail by controlling for various characteristics that might explain differences in abnormal levels of accruals.

With regard to the association between similarity scores of the notes and real earnings management proxies, correlations presented in table 4 are significantly negative. This is true for all three variables, the aggregated proxy *REM*, *Abprod* and *Abdisx*. As expected, the highest correlations are calculated for *REM* (with -0.12 and -0.18). These results supports the second hypothesis of this research that firms with similar accounting policy and revenue recognition disclosures conduct less real earnings management. Further, *Abprod* and *Abdisx* are highly correlated with *REM* (with positive correlations of 0.57 and 0.94). This was expected since *Abprod* and *Abdisx* are an inherent part of the aggregated proxy *REM*. However, it has to be taken into account that these three dependent variables are not used simultaneously in a joint test. Instead each of them is used as an alternative variable in a separate variant of the hypothesis test.

In conclusion, the vast majority of pairwise correlations shown in table 4 are significantly lower than 0.7, which suggest that there is only little overlap between the variables. There are only a few correlations that come near to the critical threshold, e.g. the significant correlation of 0.64 between *RoA* and *Zscore* or the significantly negative

correlation of -0.59 between *RoA* and *StdOpCF*. The correlations between both similarity scores and the various control variables are all less than 0.3, except *Zscore* which is negatively correlated at -0.57 with *SimilarityRevRec* and positively correlated at 0.33 with *SimilarityAccPol*. To ensure that the existence of multicollinearity can be excluded, this research calculates variance of inflation factors for all variables of the correlation matrix. The untabulated results of this robustness check do not exceed 10 and thus, confirm the Pearson pairwise correlations.

Overall, the low correlations between the independent variables including the adopted control variables show that multicollinearity should not affect the empirical results of this study. Also, the correlations between the used earnings management proxies demonstrate that there is only little overlap between the dependent variables. Hence, additional testing or even an exclusion of any variables was not required due to the low bivariate correlation of each pair of variables.

6.3 Validation Test

The findings of this research are based on the textual similarity of the notes to the accounts of firms within the same industry. In particular, two similarity scores of the notes are used. First, the full set of accounting policy disclosures and second, the revenue recognition disclosures. In order to provide robust findings, it is fundamental to validate the research results from the measurement of textual similarity (Hogan et al., 2000). In fact, this refers to:

- internal validity

- content validity

- external validity

- predictive validity

The different types of validity are described in the following sections. This should demonstrate that the adopted research approach is appropriate to analyze the textual similarity of the notes.

6.3.1 Internal Validity

According to Nunnally and Bernstein (1994), internal validity refers to systematic error. That type of error might be caused through calculation mistakes (Broberg et al., 2010). As outlined in chapter five, massive data was obtained from SEC EDGAR database by the use of Python programming language. Then the cosine similarity measure was adopted to perform a textual analysis. A big advantage of this approach is that the extent of manual working steps is reduced (Loughran and McDonald, 2016). Further, any difficult case-by-case decisions are not required. However, in the course of data processing by computers, there is a risk that machine failures, mistakes during the programming or network issues occur (Rezaee et al., 2018). Also, it is not possible to visually review big data samples according to Vijaymeena and Kavitha (2016). Therefore, additional steps were undertaken in order to ensure the internal validity. For example, a random sample of 200 notes which are included in the sample was manually selected and downloaded from SEC EDGAR. Then this manual sample was directly compared with the Python-extracted notes. The particular test is described in section 5.4 of this PhD thesis. The untabulated results of this test show a correlation of 0.95 between the manual sample and the Python-extracted notes. Hence, the detail-tagged XBRL notes are an appropriate data source for this analysis. In result, the internal validity of the adopted research approach is approved.

6.3.2 Content Validity

The textual analysis of similarities in the accounting policy and revenue recognition disclosures is based on detail-tagged XBRL notes from SEC EDGAR. A vector space model is employed for measurement of similarity. The content validity of the chosen research approach depends on the content of the notes to the accounts themselves. Due to this fact, it is fundamental to ensure that the computed similarity scores relate to the corporate reality (Clark and Watson, 1995). For this purpose, the author of this PhD thesis performed a validation test to prove the within-industry similarity. In order to define the corporate reality, it is assumed that firms in the same industry are subject to similar economic events. Further, they perform their business in the same economic environment. This corresponds with the results of previous literature in the field of accounting comparability (e.g. Peterson et al., 2015; Chen et al., 2017). Thus, managers of firms within the same industry should translate the same economic events into similar

notes to the accounts. In result, there should be a higher degree of textual similarity between the notes of firms within the same industry.

Following these underlying assumptions and given that similarity scores of the notes are a new proxy, a comparative test was performed. This should provide additional validation to the measure. For this purpose the means of *SimilarityAccPol* and *SimilarityRevRec* scores of firms across eight industries were compared. The different industries are defined according to the two-digit SIC code. In particular, the following industries were chosen for this test:

- Primary Metal Industry (SIC 33)

- Industrial and Commercial Machinery and Computer Equipment (SIC 35);

- Food Stores (SIC 54)

- Eating and Drinking Places (SIC 58)

- Real Estate (SIC 65)

- Hotels, Rooming Houses and Camps (SIC 70)

- Business Service (SIC 73)

- Legal Services (SIC 81)

It is expected that there are substantial differences in the notes of included firms. However, the following industry pairs of the test sample should have higher similarity scores due to more similar business characteristics compared to the remaining industries:

- SIC 33 and SIC 35

- SIC 54 and SIC 58

- SIC 65 and SIC 70

- SIC 73 and SIC 81

First, the both similarity scores *SimilarityAccPol* and *SimilarityRevRec* are measured for firms in a particular industry. Then the similarity scores are compared with other firms in the same industry and with other firms across the remaining seven two-digit SIC

codes. Thus, the similarity scores are aggregated for each industry pair, e.g. between SIC 33 and SIC 35 or between SIC 33 and SIC 70. This test should prove that *SimilarityAccPol* and *SimilarityRevRec* are more similar within-industry than across industries. The results of this within-industry validation test are illustrated in table 5 below. The data sample for this test covers a period of three financial years to ensure that there are no random results. The mean similarity scores within-industry are presented in bold. The first value presented in each box is the mean *SimilarityAccPol* score while the mean *SimilarityRevRec* score is listed below in parentheses.

Table 5: Content validity of similarity measurement

SIC	Industry Description	SIC 33	SIC 35	SIC 54	SIC 58	SIC 65	SIC 70	SIC 73	SIC 81
33	Primary Metal Industry	**0.207***** **(0.163)*****	0.181 (0.145)	0.129 (0.121)	0.140 (0.132)	0.098 (0.087)	0.105 (0.096)	0.137 (0.125)	0.119 (0.114)
35	Industrial and Commercial Machinery and Computer Equipment	0.181 (0.145)	**0.201***** **(0.166)*****	0.135 (0.130)	0.127 (0.123)	0.113 (0.109)	0.121 (0.114)	0.108 (0.105)	0.122 (0.117)
54	Food Stores	0.129 (0.121)	0.135 (0.130)	**0.208***** **(0.169)*****	0.164 (0.155)	0.114 (0.108)	0.107 (0.102)	0.092 (0.085)	0.125 (0.116)
58	Eating and Drinking Places	0.140 (0.132)	0.127 (0.123)	0.164 (0.155)	**0.202***** **(0.173)*****	0.097 (0.091)	0.126 (0.120)	0.131 (0.128)	0.119 (0.115)
65	Real Estate	0.098 (0.087)	0.113 (0.109)	0.164 (0.155)	0.097 (0.091)	**0.209***** **(0.171)*****	0.185 (0.156)	0.127 (0.121)	0.114 (0.106)
70	Hotels, Rooming Houses and Camps	0.105 (0.096)	0.121 (0.114)	0.107 (0.102)	0.126 (0.120)	0.185 (0.156)	**0.205***** **(0.170)*****	0.106 (0.098)	0.120 (0.117)
73	Business Service	0.137 (0.125)	0.108 (0.105)	0.092 (0.085)	0.131 (0.128)	0.127 (0.121)	0.106 (0.098)	**0.200***** **(0. 165)*****	0.153 (0.138)
81	Legal Services	0.119 (0.114)	0.122 (0.117)	0.125 (0.116)	0.119 (0.115)	0.114 (0.106)	0.120 (0.117)	0.153 (0.138)	**0.202***** **(0.171)*****

This table presents the means of *SimilarityAccPol* and *SimilarityRevRec* scores for firms across eight industries. These industries are defined in the second column. The mean similarity scores within the same industry are illustrated in bold. *** indicates significance at the 0.01 level.

As expected, the pairwise cosine measure for similarity increased if only notes of firms within the same industry were analyzed. Table 5 above shows similarity scores that are higher than 0.163 (with p-values less than 0.01) for all pairwise firm cosine combinations within the same two-digit SIC code. Overall, the within-industry similarity scores are significantly higher than the measured *SimilarityAccPol* and *SimilarityRevRec* across industries. There is an average *SimilarityAccPol* of 0.136 across all eight industries. There is a difference of 0.071 compared to the calculated within-industry *SimilarityAccPol* for SIC 33 (0.207) as presented in table 5. Against the background that the standard deviation of *SimilarityAccPol* is 0.025, as listed by the descriptive statistics, this difference is large. However, it must be taken into account that the descriptive statistics presented in table 2 are only measured within-industry. Thus, the standard deviation of 0.025 is related to within-industry measurement of *SimilarityAccPol*. Instead, the above outlined validation test compares the similarity scores across eight different industries. Thus, the results from descriptive statistics cannot be directly transmitted to this validation test.

Furthermore, the results of the test also show higher similarity scores for the above listed industry pairs. For instance, there is a *SimilarityAccPol* score of 0.164 for the combination SIC 54 and SIC 58. As a comparison, the *SimilarityAccPol* score for the combination SIC 33 and SIC 54 is only 0.129 as shown in table 5. As mentioned above, the mean *SimilarityRevRec* scores are listed in parentheses in table 5. Overall, the test results for *SimilarityRevRec* are quite similar to those of *SimilarityAccPol*. There are statistically significant results with p-values less than one percent for all pairwise firm cosine combinations within the same two-digit SIC code.

In conclusion, the level of textual similarity rises if there is a limitation regarding the industry specification of underlying data sample. This PhD thesis focuses on within-industry similarity of the notes. The above outlined within-industry validation test shows that both similarity scores *SimilarityAccPol* and *SimilarityRevRec* measure textual similarities of the notes in accordance with the underlying expectations of this PhD thesis. Also, these results comply with the prior literature in the field of accounting comparability. Therefore, the content validity is approved.

6.3.3 External Validity

The external validity should ensure the objectivity of mean cosine measure. The results should be free of human perceptions (Clark and Watson, 1995). As outlined in section 5.1, the cosine similarity measure is a vector space model. It is straightforward to construct and compute. A big advantage of the adopted research approach is that manual data collection and difficult case-by-case decisions are not required. For instance, researchers do not have to decide about the particular industry of a firm because of industry-specific codes (SIC) of SEC filings (Bartov and Konchitchki, 2017). Publicly listed US firms which are obligated to submit their financial statements need to register on the SEC EDGAR system in advance. It is mandatory required to tag the SIC code during the registration process. Consequently, the notes of firms within the same industry can be selected according to the SIC code. Thus, human-based classifications are not required. Due to the specification through SIC, there is no risk of varying definitions of firms within 'same industry' through human perceptions.

Furthermore, a big advantage of the XBRL-formatted notes is that the data is not aggregated. In contrast to other data sources, e.g. Compustat, the XBRL information is truly presented "as reported" or filed by the firm with the SEC. Hence, there is no risk of biased information or a lack of information through subjective aggregation. In conclusion, the external validity of the employed research approach is approved.

6.3.4 Predictive Validity

The fourth test proves the predictive validity. It should ensure that the cosine similarity measure predicts the impact of an outside criterion (Hogan et al., 2000). This research explores the impact of textual similarity of the accounting policy and revenue recognition disclosures of firms within the same industry. In particular, it is analyzed if more similar notes are related to lower levels of earnings management. Following the comparability theory, firms within the same industry should be subject to similar risks, growth perspectives and eventually similar cash flows. By extending this theory, managers of comparable firms should translate the same economic events into similar notes and contain similar earnings and discretionary accruals. More similar notes also increase the transparency of the financial reporting. This in turn reduces the opportunities to manipu-

late the earnings without scrutiny. Hence, the cosine similarity measure should show if there is an impact of more similar notes on the earnings management behaviour.

Moreover, there is a lack of existing theory about textual similarities of the accounting policy and revenue recognition disclosures. Therefore, it is also required that the adopted research approach is able to capture which factors determine textual similarity of the notes. The results from validating the properties of the similarity scores are outlined in the subsequent section of this chapter. In summary, it is demonstrated that similarity of the notes is mainly related to factors that capture economic comparability. This result is consistent with the findings of the accounting comparability research.

Furthermore, the empirical results from testing the hypotheses of this PhD thesis are discussed in the subsequent sections. Overall, it is shown that more similar notes are negatively associated with earnings management. This corresponds with the theory which was developed in this PhD thesis by drawing on findings from closely related fields of research (see chapter 4). According to the developed theory, more similar notes of the notes are positively related to earnings quality. Hence, the adopted research approach is appropriate in order to predict the impact of within-industry similarity of the notes on earnings management behaviour. In conclusion, the cosine similarity measure leads to predictive validity.

6.4 Testing of Hypotheses

The findings of this PhD thesis are robust to several tests which were performed to control for different variables that may be related to similarity of the notes. Therefore, the empirical analysis is begun by validating and focusing on the properties of the similarity scores of the notes before testing the both hypotheses of this research. This study aims to find out what factors determine similarity of the accounting policy and revenue recognition disclosures. Moreover, this PhD thesis analyzes if textual similarities of the notes relative to other firms in the same industry are able to capture earnings quality. This is not straightforward, since similar firms use different accounting choices within US GAAP. This can be due to divergent firm-specific tax planning strategies or operating strategies (Bratten et al., 2016; Gleason et al., 2017). Hence, there can be differences in a firm's accounting choices that do not reflect less economic comparability. Inferences with regard to earnings management could be misleading, because lower similarity scores of the notes are not necessarily related to earnings quality.

Following the discussion above, it must be specified which factors influence the similarity of accounting policy and revenue recognition disclosures. The different sections of the notes provide slightly different information about the earnings quality. For instance, the revenue recognition disclosures contain information about a firm's future earnings. In essence, misreported revenues lead to decreasing earnings quality. Therefore, it is especially beneficial to focus on different parts of the notes in order to identify earnings management.

In addition, the firm-year accounting comparability measure *Ind_acctcomp* as developed by De Franco et al. (2011) is included in the validation test. The *Ind_acctcomp* can be obtained from Rodrigo S. Verdi's website (http://www.mit.edu/~rverdi/). In this context, it has to be taken into account that the Rodrigo S. Verdi's website also uses an aggregated median measure described as *Indmd_acctcomp*. The *Indmd_acctcomp* was named *CompAcctInd* in De Franco et al. (2011). The untabulated statistics show that the distributions of *Ind_acctcomp* and *Indmd_acctcomp* are highly correlated with each other. However, this should not have any effects on the inferences drawn in this PhD thesis since an input-based measure is used. Overall, the additional inclusion of the accounting comparability measure *Ind_acctcomp* in the validation test of this research enhances the understanding of the relation between input and output-based comparability measures. Further, the inclusion controls for factors that might explain variations regarding the similarity of the notes.

The previous research in this field has shown thus far that accounting policy notes are more similar within the same industry than across industries (Peterson et al., 2015). This is in line with the comparability theory which states that firms within the same industry are more comparable in their business characteristics and in their economic environment. Hence, such firms should translate the same economic events into similar qualitative accounting information issued through their notes. Furthermore, McMullin (2014) states that firm-pair similarity of the notes is positively associated with accounting comparability. Also, McMullin (2014) finds that firms sharing the same auditor have more similar notes to the accounts. However, the previous research does not give insight on within-industry variations of the notes. Therefore, this PhD thesis extends the existing research by focusing on firm-year level comparability. Further, it specifies in more detail which factors influence textual similarity of the notes of firms within the same industry.

Given that textual similarity scores are fairly new in accounting research, it is required to validate the measure in advance. As shown in models (8) and (9) below, the validation test includes two dependent similarity variables of the notes to the accounts. These are the full set of accounting policy (*SimilarityAccPol*) and revenue recognition *(SimilarityRevRec)* disclosures. Further, the review of the existing literature showed that there are a few characteristics that should explain differences in within-industry similarity of the notes. These are included as independent variables in the models. By following the previous studies in the field of accounting comparability, all independent variables except the binary variable *SpecialistAuditor* are adjusted by subtracting their industry-year median (e.g. De Franco et al., 2011; Peterson et al., 2015). This adjustment aims to control different levels of variables across industries due to, for instance, different risks and growth prospects. However, since there is a low number of observations in each industry and year (not exceeding 420 observations), the median should be less affected by outliers.

Further, a Taylor expansion for note length is used to adjust both similarity scores (see section 5.2). This is required to ensure reliable research results since document length influences the raw similarity sores. Also, the measurement uses standard errors clustered by firm. Further, the adopted model includes industry-year fixed effects. These are based on the two-digit SIC code. The fixed effects should avoid that changes in the sample over time of included sample period and across industries influence the results. For instance, the business environment of an industry may be changed from the previous year. Also, new disclosure requirements and adjustments of accounting standards can lead to changes in the accounting policy and revenue recognition disclosures. Finally, this PhD thesis holds constant the annual economic changes. In conclusion, the following two models are estimated in order to validate the measure:

First, the similarity score of the full set of accounting policy disclosures is tested,

(8)

$$
\begin{aligned}
SimiliarityAccPol \\
= \beta_0 + \beta_1(Comparability\ Indicators) + \beta_2(Disclosure\ Quality) \\
+ \beta_3(Financial\ Characteristics) + \varepsilon
\end{aligned}
$$

followed by validating the similarity score of revenue recognition disclosures.

(9)

$$SimiliarityRevRec$$
$$= \beta_0 + \beta_1(Comparability\ Indicators) + \beta_2(Disclosure\ Quality)$$
$$+ \beta_3(Financial\ Characteristics) + \varepsilon$$

where *(SimilarityAccPol)* the full set of accounting policy and *(SimilarityRevRec)* reve-nue recognition disclosures are alternatively used as the dependent variables. The inde-pendent variables adopted by models (8) and (9) should explain differences in within-industry similarity of the notes. Overall, there are 14 distinct variables as shown on the left-hand column of table 6 below. These can be summarized into the groups of 'Com-parability Indicators', 'Disclosure Quality' and 'Financial Characteristics'.

To support the statistical findings, there are the following two tests of significance ap-plicable for multiple regressions:

- t-test considers each of the regression coefficients separately; and

- F-test shows if a few or all of the regression coefficients of the model are (collective-ly) different from zero.

The following figure illustrates the differences between both available tests of signifi-cance that are explained below.

Figure 10: Overview about hypothesis tests for multiple regressions
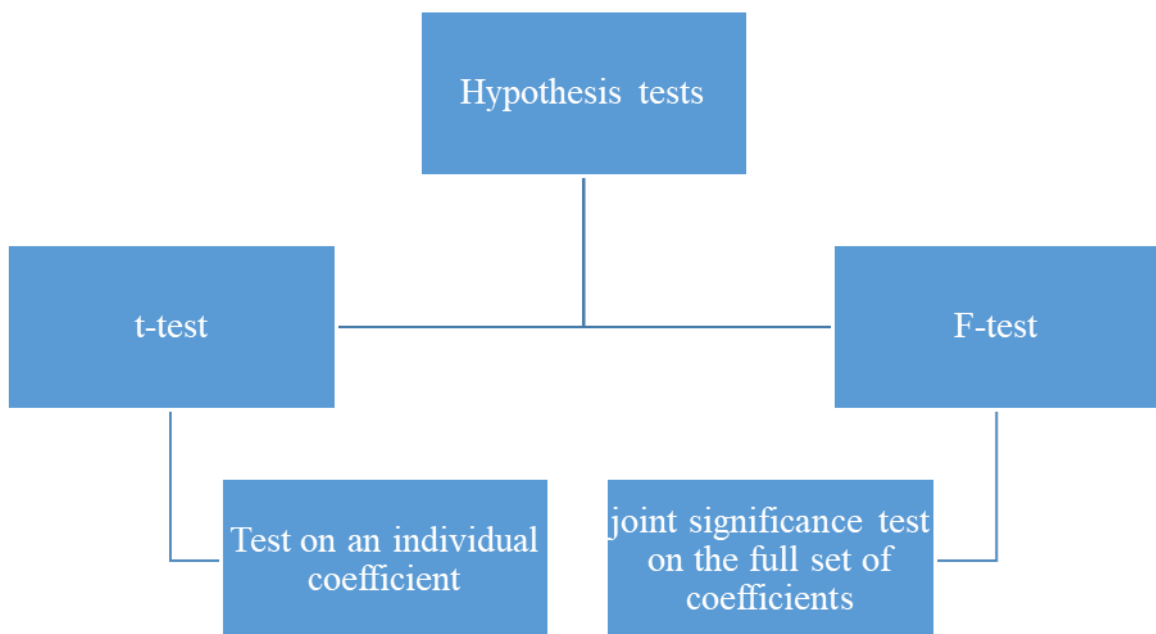
Both t-statistics and F-statistics are used to test the significance of the included variables in the validation test and the both hypotheses tests in the remainder of this chapter. Researchers commonly use the F-test to test the difference between two independent estimates of variance (Pallant, 2016). It must be taken into account that there are different available variants of the F-test (Lind et al., 2015). First, the F-test can show the significance of the full set of regression coefficients on the model. Second, it can be limited to a certain subgroup of regression coefficients. Thus, the F-test can also demonstrate if a few regression coefficients of the model are collectively different from zero. By following many previous studies (e.g. Brown and Tucker, 2011), this research uses the first variant and tests the overall significance caused by the full set of regression coefficients. As shown in the figure above, this is also described as joint significance test (Lind et al., 2015).

Beside the F-Test, this study further supports the significance of statistical findings with additional t-test. By following many previous studies, t-statistics are calculated by using standard errors clustered by firm to adjust for firm-level correlation over time (e.g. Peterson et al., 2015). Table 6 below and also tables 7 and 8 in the remainder of this chapter present robust t-statistics. These are shown in parentheses below coefficients. The t-statistics demonstrate that each of the regression coefficients, considered separately, is secured against $\beta_1 = 0$ and $\beta_2 = 0$ and [...] $\beta_{14} = 0$.

As explained above, it is additionally tested if the entire set of regression coefficients is collectively different from zero. This cannot be proved by the t-test since it only shows whether there is a significant effect of an individual coefficient. Due to this fact, it is tested if the following null hypothesis (H_0) can be rejected by conducting an additional F-test. The null hypothesis is an equation that includes not only one, but multiple regression coefficients. It asserts that the explanatory variables (β_1 till β_{14}) of the model are jointly not significant. H_0 is tested as follows:

$$H_0: \beta_1 = \beta_2 = ... = \beta_{14} = 0$$

where β_1 till β_{14} mean each of the variables illustrated in table 6. These are summarized into three groups which is considered by models (8) and (9) above. First, β_1 till β_5 include the comparability indicators as listed on the left-hand column of table 6. Second, β_6 till β_9 cover the group of disclosure quality factors and third, β_{10} till β_{14} the financial characteristics. The β_0 is not included by H_0. This is due to the fact that β_0 means the

intercept and only the influence of variables on the slope of the regression line is tested to prove if the independent variables adopted by the model improves the fit.

If the null hypothesis is not rejected, this would demonstrate that no significance is caused by the full set of independent variables in the model. In contrast, the alternative hypothesis (H_a) asserts that at least one of the regression coefficients is different from zero. Therefore, H_a is developed as follows:

$$H_a: \beta_i \neq 0 \; for \; at \; least \; one \; i = 1,2, \dots ,14$$

The alternative hypothesis aims to prove the predictive capability of the multiple regression. This would mean that there is a collective significance of the adopted independent variables in explaining similarity of the accounting policy and revenue recognition disclosures. As outlined above, H_a includes the full set of regression coefficients. Therefore, the joint significance test does not specify how many or which of the regression coefficients are significantly different from zero.

Overall, the F-values shown in table 6 reject the null hypothesis and thus, support the significance of statistical findings. In addition, t-tests are conducted to prove if there is a significant effect of individual regression coefficients. In conclusion, the F-values and t-statistics prove that the independent variables described on the left-hand column of table 6 are appropriate to explain variations in the textual similarity of the notes.

Table 6 below presents the results of the validation test including t-test and F-test. For both similarity scores the accounting policy and revenue recognition disclosures, two specifications are presented. The first specification which is referred as (1) and (3) excludes the comparability measure *Ind_acctcomp* of De Franco et al. (2011). This exclusion is due to the fact that the output-based accounting comparability indicator is based on earnings itself (Peterson et al., 2015). Thus, this indicator might not be appropriate to explore the association between similarities of the notes and earnings quality. As mentioned above, robust t-statistics are shown in parentheses below coefficients. The R-squared are adjusted as presented on the bottom row of following table 6. This is a commonly used and appropriate method that provides accurate results (Lind et al., 2015). Adjusted R-squared and F-statistics are used to test the significance of the included variables in explaining textual similarities of the accounting policy and revenue recognition disclosures.

Table 6: Validation of adopted similarity scores

Variables	Predictions	Dep. Var = SimilarityAccPol		Dep. Var = SimilarityRevRec	
		(1)	(2)	(3)	(4)
Comparability indicators					
Ind_acctcomp	+		0.001		0.001
			(1.35)		(1.07)
StdSalesAdj	-	-0.017**	-0.019**	-0.031**	-0.026**
		(-2.59)	(-2.64)	(-2.94)	(-2.81)
StdOpCFAdj	-	-0.006*	-0.028*	-0.039**	-0.061*
		(-1.60)	(-1.75)	(-2.47)	(-1.93)
CCCAdj	-	-0.000**	-0.000**	-0.001***	-0.000**
		(-2.87)	(-2.41)	(-3.92)	(-2.85)
|MultipleAdj|	-	-0.003***	-0.004***	-0.003**	-0.000**
		(-6.92)	(-5.65)	(-2.71)	(-2.13)
Disclosure Quality					
SizeAdj	+	0.001**	0.000**	0.003***	0.003***
		(2.99)	(2.37)	(7.19)	(5.24)
SpecialistAuditor	+	0.009***	0.007**	0.005**	0.008**
		(4.37)	(2.85)	(2.72)	(2.06)
|UnusualLengthAccPol|	-	-0.019***	-0.014**		
		(-6.13)	(-2.98)		
|UnusualLengthRevRec|	-			-0.010**	-0.008**
				(-2.72)	(-2.38)
Financial Characteristics					
RoAAdj	-	-0.013**	-0.029***	-0.014**	-0.057***
		(-2.60)	(-4.95)	(-2.72)	(-5.17)
BTMAdj	+	0.001	0.001	0.005*	0.001*
		(1.03)	(0.61)	(1.96)	(1.60)
LeverageAdj	-	-0.014***	-0.013**	-0.033***	-0.046***
		(-4.97)	(-2.88)	(-6.29)	(-5.08)
CapIntAdj	-	-0.020*	-0.004*	-0.054	-0.051
		(-1.98)	(-1.60)	(-1.45)	(-0.70)
SalesGrowthAdj	-	-0.001	-0.004	-0.014**	-0.011**
		(-0.55)	(-1.27)	(-2.79)	(-2.35)
Constant		0.351***	0.347***	0.260***	0.265***
		(28.19)	(27.04)	(32.70)	(19.52)
Fixed Effects		Yes	Yes	Yes	Yes
N		1,447	1,447	1,447	1,447
F-value		8.21***	6.59***	6.44***	6.10***
Adjusted R-squared		0.304	0.301	0.298	0.285

151

See Appendix 3 for variable definitions. An intercept was included in each model. ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 levels.

As outlined on the left-hand side of table 6 above, the first group of independent variables includes several comparability indicators. The predicted influence is listed in the second column of table 6. In the following, the results are outlined by discussing how these factors can explain firm-year level similarity. First, the mean of the firm-year accounting comparability score ***Ind_acctcomp*** is included in the test (De Franco et al., 2011). This output-based comparability score captures how well two firms map similar economic events into accounting information. If similarity of the notes is able to capture this kind of accounting comparability, then a positive coefficient can be expected. However, the results above do not show a statistically significant effect of *Ind_acctcomp* on either of the two similarity scores of the notes. The coefficient on *SimilarityAccPol* is 0.001 (with a t-value of 1.35) and the coefficient on *SimilarityRevRec* is also 0.001 (with a t-value of 1.07). Therefore, the degree of how similar firms translate stock returns into accounting numbers does not explain similarity of the notes. Nonetheless, since sales should be one of the financial statement items most heavily influenced by the market, the detailed analysis of the notes demonstrates that textual similarity of the notes may capture underlying differences in economic events across firms.

Second, the influence of ***StdSalesAdj*** on the similarity of the notes is tested. The previous research showed that sales volatility indicates a volatile environment, where firms are more likely to use approximations in their financial statements (e.g. Dechow and Dichev, 2002). This in turn increases the probability of estimation errors. In contrast, low-volatility firms' notes should remain relatively unchanged over time, which would eventually result in more comparable notes across industry peers. Hence, the researcher of this study predicts a negative relation between higher sales volatility and similarity of the notes to the accounts. The results of the validation test are statistically significant (with p-values less than 0.05) and consistent with this assumption. Therefore, the indicator of sales volatility explains accounting comparability as well as similarity of the notes.

Further, the ***StdOpCFAdj*** is included in the validation test. It is expected that comparable firms have more stable cash flows over time. This is due to the fact that consistent cash flows are an indicator for a more comparable business environment. In contrast,

cash flow volatility is related to a volatile environment. This in turn increases the prob-ability that firms use accounting policies against the industry practice. As a conse-quence, such firms have also dissimilar accounting policy disclosures. Thus, a negative relation between cash flow volatility and similarity of the notes is predicted. This com-plies with the significantly negative results illustrated in table 6 above. There are signif-icant effects with p-values of at least less than ten percent in all four specifications.

Moreover, the impact of **_CCCAdj_** on the textual similarity of the notes is tested. The length of the cash-to-cash cycle is measured in days. While many studies include the operating cycle as a proxy for low accruals' quality (e.g. Dechow and Dichev, 2002), the cash-to-cash cycle is used in this paper, since it additionally addresses the ability of a firm to repay its credit. Comparable firms should have similar inventory, receivables, and payables conversion periods. A short cash-to-cash cycle should represent sound working capital management, as well as better accessibility to cash in the short run. If firms have longer cash-to-cash cycles compared to the industry median, the earnings might be influenced upwards. This improves the accessibility to cash for such firms. However, the managed earnings cause dissimilar notes. Hence, it is predicted that long-er cash-to-cash cycles negatively influence the similarity of the notes. As expected, each of the four specifications shows negative and significant results (with p-values of at least less than 5 percent).

Finally, the group of comparability indicators concludes with **_|MultipleAdj|_**. According to De Franco et al. (2011), some comparability measures in accounting research are based on price multiples. Thus, the price-sales multiple is included to find out if under- or overvaluation of the firm's market price influences the similarity of the notes. By drawing on the research of De Franco et al. (2011), the market value of a firm is based on price multiples. In particular, the price-sales multiple is calculated as the natural log of a firm's market cap to sales revenue of the current fiscal year. Both market capitaliza-tion and sales revenue should be less affected by manipulations, compared to measures like earnings. Hence, the industry-adjusted absolute value of *Multiple* is used in the val-idation test. This is due to the expectation of this research that those firms that are either being under- or overvalued will show differences in their notes to the accounts. Accord-ingly, a negative association is predicted. The significantly negative results (with p-values of at least less than 0.05) in table 6 approve this prediction.

The second group of independent variables includes several factors that are related to disclosure quality. In the following, it is tested whether these indicators also capture similarities in the accounting policy and revenue recognition disclosures. In particular, the influence of firm size, audit quality *SpecialistAuditor*, and abnormal disclosure length is tested. First, the impact of the variable ___Size___ is analyzed. By following Peterson et al. (2015), it is measured by calculating the natural log of market value of equity. Previous research in the field of disclosure quality found out that smaller firms change their accounting policies or revenue recognition disclosures more frequently (Peterson et al., 2015). These changes come along with operational changes which take place more often in smaller firms than in bigger ones. Furthermore, operational changes in bigger firms might be insignificant in relation to the extent of current operations of such firms. Therefore, the business environment and the accounting principles of bigger firms should remain relatively unchanged over time. This in turn leads to more consistent and similar notes compared to peers. Hence, it is predicted that firm size positively influences the similarity of the notes. As expected, the specifications (1) till (4) in table 6 show significant positive results with p-values of least less than 5 percent.

Further, the impact of ___SpecialistAuditor___ on the similarity of the notes is tested. With respect to the choice of auditors, McMullin (2014) provides evidence that firms that share the same auditor have a higher degree of similarity in their notes to the accounts. Moreover, Dunn and Mayhew (2004) find that clients of industry-specialist audit firms in the same industry have better disclosure quality, as rated by financial analysts. In particular, experienced auditors with knowledge spillovers from other audits in the same industry should have a holistic view of a firm's accounting (Zhang, 2012). According to the PCAOB Auditing Standard (AS) No. 12, paragraph 12, auditors of public companies are supposed to "evaluate whether the company's selection and application of accounting principles are appropriate for its business and consistent with the applicable financial reporting framework and accounting principles used in the relevant industry" (PCAOB, 2010). Pursuant to paragraph 12 of PCAOB AS No. 16, auditors should also inform the audit committee about "[…] disclosures of significant accounting policies in controversial areas or […] in areas for which there is […] diversity in practice" (PCAOB, 2012). Consequently, auditors should be familiar with accounting practices of the firm and its industry. Following this it can be inferred that accounting policy choices are more similar if firms are subject to high-quality audits (Zhang, 2018). Hence, high-

quality auditors play a key role in firms' disclosure policies, leading to better disclosure quality through the application of industry-specific accounting policies.

The study of Healy and Palepu (2001) outlines that if auditing and accounting regulations worked perfectly, firms would only change accounting policies in cases, where they adopt new business models. In an imperfect setting, they argue, managers could make accounting decisions and disclosures in order to manage reported performance. Thus, high-quality audits may lead to consistent and similar notes to the accounts compared to peer firms. In order to measure the audit quality, a binary variable, *SpecialistAuditor*, is constructed by assigning the auditor with the largest number of audits of each industry-year as the specialist auditor in the sample. In sum, theory and empirical findings suggest that auditors influence the preparation of the notes. This is despite the fact that it should actually be managers' sole responsibility. Therefore, a positive coefficient is predicted, since firms audited by a high-quality auditor are expected to have a higher degree of textual similarity in their notes. This prediction is approved by positive and statistically significant results (with p-values of at least less than 0.05) in all four specifications.

Furthermore, the influence of text length on the similarity of accounting policy and revenue recognition disclosure is tested. Thus, the variables *|UnusualLengthAccPol|* and *|UnusualLengthRevRec|* are adopted in this PhD thesis. By following Peterson (2008), both abnormally high and low levels of disclosure length can impair the comparability of accounting information. He measures abnormal levels of accounting policy disclosure length cross-sectionally. In his study the disclosure length is regressed on many different independent variables. Therefore, previous research argues that this measurement includes too many different factors, which might lead to uncertainties regarding the results (Dichev and Li, 2013). In order to avoid this shortcoming, the log number of words was introduced by Peterson (2008) and Li (2008) as appropriate measure. Following this, the variables *|UnusualLengthAccPol|* and *|UnusualLengthRevRec|* are calculated by taking the absolute difference of the log number of words of the accounting policy and revenue recognition disclosures for the firm and its industry-year median. In result, higher values of *|UnusualLengthAccPol|* and *|UnusualLengthRevRec|* should represent a higher degree of uncertainty and less disclosure quality about accounting information. Consequently, it is predicted that abnormal disclosure length negatively influences the similarity of both the full set of accounting policy and the revenue recog-

nition disclosures. This is confirmed by significantly negative results (with p-values of at least less than 0.05) as presented in table 6 above.

With regard to the inclusion of the variables *|UnusualLengthAccPol|* and *|UnusualLengthRevRec|*, the major limitation of the cosine similarity measure must be taken into account. As outlined in section 5.2, the raw similarity score increases with disclosure length. This shortcoming of the adopted similarity measure could lead to biased results. Indeed, the validation test could show effects that are opposed to the predictions. However, this PhD thesis adjusts for the effect of note length by using a Taylor-polynomial. The properties and benefits of this adjustment are described in chapter five. In conclusion, the risk of biased results is minimized through Taylor expansion for note length. Therefore, including the variable text length of the notes in the validation test leads to reliable results in this specific research setting.

Finally, the third group of independent variables includes several factors that determine the financial situation of a firm. In the following, it is tested whether financial characteristics such as return on assets, book-to-market ratio, a firm's leverage, capital intensity, and sales growth can control for variations in the textual similarity of the notes. First, the influence of ***RoAAdj*** is analyzed. It is calculated as the income before extraordinary items divided by lagged total assets. In result, there is a higher probability of income-increasing accounting choices amongst firms with a high return on assets according to the previous research (e.g. Dichev and Li, 2013). This in turn leads to dissimilar notes compared to industry peers. Hence, a negative coefficient is predicted, since firms with a high return on assets should have less similar notes. This prediction is approved by negative and significant results (with p-values of at least less than 0.05) in all four specifications.

Furthermore, the variable ***BTMAdj*** is adopted in this research. The book-to-market ratio measures the growth of a firm. A lower book-to-market ratio indicates higher growth. In contrast, firms with lower growth have higher book-to-market ratios. According to Peterson et al. (2015), firms with lower growth are supposed to be more conservative and consistent in their financial statements. In line with these results, Dichev and Li (2013) argue that growth firms have the capability to use aggressive and income-increasing accounting choices. Further, their research shows that growth firms might also have some incentives such as raising external capital according to Collins et al. (2017). Overall, this is translated into less similar notes. In contrast, firms with higher book-to-

156

market ratios, should contain more similar notes. Hence, it is predicted that the book-to-market ratio is positively related to the similarity of the notes. However, except in specification (3) and (4), this PhD thesis does not obtain statistically significant results for this claim. Thus, the growth of a firm does not significantly affect the full set of accounting policy disclosures. However, the empirical results imply that there is a higher propensity to aggressive revenue recognition amongst growth firms in comparison to industry peers. Also, the positive and significant results (with p-values less than 0.10) show that more accelerated revenue recognition is captured in less similar revenue recognition disclosures across firms within the same industry.

The leverage is an important financial ratio that can affect the development of a firm (Dichev and Li, 2013). For instance, it is used for rating purposes by banks and rating agencies. Further, a high leverage indicates financial distress of a firm. Therefore, this research includes the variable ***LeverageAdj***. It is calculated as total debt divided by total assets. According to Anagnostopoulou and Tsekrekos (2017), firms with a higher leverage tend to adopt income-increasing accounting choices in order to improve their access to cash in the short run. This in turn leads to less similar accounting policy disclosures compared to industry peers. Consequently, it is predicted that a higher leverage negatively influences the similarity of the notes. This is confirmed by significantly negative results (with p-values of at least less than 0.05) in all specifications of table 6 above.

Moreover, this PhD thesis includes the variable ***CapIntAdj***. It is measured by calculating the net property plant and equipment divided by total assets. The accounting information of firms with higher capital intensity is less comparable with industry peers according to the previous research (e.g. Dichev and Li, 2013). This is due to the fact that capital intensity can cause higher magnitudes of total accruals through depreciations and impairment of fixed assets. Consequently, firms with higher capital intensity might have to explain more accounting issues. This in turn leads to textual differences in the notes of such firms. Hence, it is predicted that capital intensity negatively influences the similarity of the notes. However, except in specification (1) and (2), table 6 does not show statistically significant results for this prediction. This implies that there is no impact of capital intensity on the content of the revenue recognition disclosures.

Finally, the variable ***SalesGrowthAdj*** is tested. It is measured as changes in sales from the previous year divided by lagged sales. According to Altamuro et al. (2005), there is an increased propensity to aggressive revenue recognition amongst firms with growing

sales. It can be inferred that more accelerated revenue recognition is captured in less similar revenue recognition disclosures compared to industry peers. Therefore, a negative correlation between SalesGrowthAdj and the similarity of revenue recognition disclosures is predicted. Indeed, the negative and statistically significant results (with p-values less than 5 percent) in specifications (3) and (4) approve this prediction. As expected, there are only marginal effects on the similarity of the full set of accounting policy disclosures.

Concerning the choice of similarity measure between the full set of accounting policy and revenue recognition disclosures, both note scores seem to have similar properties with regard to comparability and disclosure quality indicators. Overall, the results in table 6 show stronger effects for *SimilarityAccPol* than for *SimilarityRevRec*. There are F-statistics of 8.21 and 6.59 when *SimilarityAccPol* is the dependent variable and of 6.44 and 6.10 when *SimilarityRevRec* is the dependent variable. Further, the R-squares presented for specifications (1) and (2) are more significant than the R-squares for (3) and (4). This was expected since the variable *SimilarityAccPol* includes the entire textual accounting policies such as inventory policy, revenue recognition, or depreciation and amortization methods. In contrast, *SimilarityRevRec* only contains the revenue recognition. Due to this fact, an aggregate similarity score of accounting choices compared to a single accounting policy, such as, for example, revenue recognition, might be better to explain differences and similarities in accounting information between firms in a given industry. However, it has to be taken into account that the different parts of the notes capture distinct aspects of earnings quality. For instance, the revenue recognition disclosures contain particular information about future earnings.

In conclusion, the findings of the validation analysis support the notion that similar notes are linked to factors that capture economic comparability. Further, the results show that the similarity scores are related to disclosure quality and partially related to factors explaining accounting comparability. Overall, the majority of results in table 6 are consistent with the predictions. The significance of these results is confirmed by F-values presented at the bottom row of table 6. This collectively supports the validation of both adopted similarity scores *SimilarityAccPol* and *SimilarityRevRec*. Based on the validation analysis, coupled with the findings by prior literature in related fields of research, this PhD thesis concludes that both similarity scores capture variations in the similarity of notes across firms within the same industry.

6.5 Similarity of the Financial Notes to the Accounts and Accrual-based Earnings Management

In the following section the hypothesis about the association between similarity of the notes to the accounts and accrual-based earnings management activities is tested. For this purpose, unsigned discretionary accruals (*AbsDAC*) are used as the dependent variable. A disadvantage of managing accruals is that accruals reverse over time. Also, various accounting policy choices are offered under US GAAP to manage the accruals either upwards or downwards. If dissimilar notes should be able to explain future abnormal levels of accruals, there is no logical reason for a particular direction of these accruals. However, an overall absolute effect of these accruals is expected. Hence, unsigned discretionary accruals are adopted in this PhD thesis.

The discretionary accruals are measured by the cross-sectional Modified Jones Model, as proposed by Dechow et al. (1995) and Cohen et al. (2008). The Modified Jones Model takes the findings of Thomas and Zhang (2002) into account. They state that there may be no association between earnings management activities and the variations in discretionary accruals measured by the Jones Model. Indeed, these variations are caused through changes in inventory (Thomas and Zhang, 2002). Thus, the Modified Jones Model excludes the effects from inventory changes when measuring the total accruals.

In order to control for variables that might cause differences in the accruals, several control variables are included by the equation below. Indeed, this research takes into account that there are other firm characteristics beside *SimilarityAccPol* and *SimilarityRevRec* that should influence the discretionary accruals. Each of the adopted control variables and its measurement are explained in more detail in the "Variable descriptions" included as Appendix 3 to this research.

By following many previous studies about earnings quality (e.g. Peterson et al., 2015), this PhD thesis aims to measure the absolute discretionary accruals. This means that the absolute difference in the quality of the accruals between firms within the same industry must be calculated. For that reason, following the model of Peterson et al. (2015), all of the included control variables with *Adj* suffixes are measured as the absolute difference of the variable for the firm and its industry-year median. This adjustment should ensure that abnormal results or variability compared to the industry-year median do not influ-

ence the inferences in this research. It is a common method to control for effects by firm-specific outliers which was also adopted by previous research (Ashbaugh-Skaife et al., 2008; Francis, 2004).

However, all the regressions in this study are rerun by using non-industry adjusted control variables. By doing this, it is tested whether the use of industry-adjusted control variables is the main driver of the empirical results in the thesis. For the sake of brevity, these robustness checks are not presented. The untabulated test results are very similar to those reported in the main part of this study. Consequently, the use of non-industry adjusted control variables does not change the main empirical findings and conclusions of this research.

The following equation is estimated:

(10)

$$
\begin{aligned}
AbsDAC_{it} = {} & \beta_0 + \beta_1 SimiliarityNote_{i,t-1} + \beta_2 IndAcctcomp_{i,t-1} + \beta_3 |SizeAdj|_{i,t} \\
& + \beta_4 |RoAAdj|_{i,t-1} + \beta_5 |BTMAdj|_{i,t} + \beta_6 |LeverageAdj|_{i,t} \\
& + \beta_7 |OpCycleAdj|_{i,t} + \beta_8 |StdOpCFAdj|_{i,t} + \beta_9 |StdSalesAdj|_{i,t} \\
& + \beta_{10} |CapIntAdj|_{i,t} + \beta_{11} |ZscoreAdj|_{i,t} + \beta_{12} BigFour_{i,t} + \varepsilon_i
\end{aligned}
$$

where for fiscal year *t* and firm *i*, unsigned discretionary accruals (*AbsDAC*) are used as the dependent variable. The independent variable *SimilarityNote* denotes the both similarity scores of the notes, either the full set of accounting policy disclosures *SimilarityAccPol* or the revenue recognition disclosures *SimilarityRevRec*. Therefore, the estimated equation (10) can be separated into the following two equations:

(11)

$$
\begin{aligned}
AbsDAC_{it} = {} & \beta_0 + \beta_1 SimiliarityAccPol_{i,t-1} + \beta_2 IndAcctcomp_{i,t-1} + \beta_3 |SizeAdj|_{i,t} \\
& + \beta_4 |RoAAdj|_{i,t-1} + \beta_5 |BTMAdj|_{i,t} + \beta_6 |LeverageAdj|_{i,t} \\
& + \beta_7 |OpCycleAdj|_{i,t} + \beta_8 |StdOpCFAdj|_{i,t} + \beta_9 |StdSalesAdj|_{i,t} \\
& + \beta_{10} |CapIntAdj|_{i,t} + \beta_{11} |ZscoreAdj|_{i,t} + \beta_{12} BigFour_{i,t} + \varepsilon_i
\end{aligned}
$$

(12)

$$AbsDAC_{it} = \beta_0 + \beta_1 SimiliarityRevRec_{i,t-1} + \beta_2 IndAcctcomp_{i,t-1} + \beta_3 |SizeAdj|_{i,t}$$
$$+ \beta_4 |RoAAdj|_{i,t-1} + \beta_5 |BTMAdj|_{i,t} + \beta_6 |LeverageAdj|_{i,t}$$
$$+ \beta_7 |OpCycleAdj|_{i,t} + \beta_8 |StdOpCFAdj|_{i,t} + \beta_9 |StdSalesAdj|_{i,t}$$
$$+ \beta_{10} |CapIntAdj|_{i,t} + \beta_{11} |ZscoreAdj|_{i,t} + \beta_{12} BigFour_{i,t} + \varepsilon_i$$

The coefficients on *SimilarityAccPol* and *SimilarityRevRec* are the test of first hypothesis. It is expected that firms with more similar notes compared to firms in the same industry and year, conduct less accrual-based earnings management. Thus, a negative sign is predicted for the results. Following theory and to mitigate endogeneity concerns, both similarity scores of the notes and *Ind_acctcomp* are lagged by one year. As outlined in the remainder of this chapter, both the content of the notes and decision about earnings management activities are most likely jointly determined by the management. Further, there is another endogeneity issue regarding the output-based accounting comparability indicator by De Franco et al. (2011). It is based on the earnings themselves. Consequently, there is a risk that the effects shown for the variable *Ind_acctcomp* in the hypothesis test are caused through this endogenous relationship. Following this, lagging of the independent variable is an appropriate method to control for endogeneity (Nikolaev and Van Lent, 2005).

Also, a Taylor expansion for note length is used to adjust both similarity scores *SimilarityAccPol* and *SimilarityRevRec*. As explained in section 5.2, this modification is required to ensure reliable research results since document length influences the raw similarity sores. This PhD thesis further relies on Peterson et al. (2015) and Ashbaugh-Skaife et al. (2008) concerning the choice of the control variables and control for firm characteristics that should explain variations of discretionary accruals within an industry and year. These are *Size* as calculated by the natural logarithm of market capitalization, the length of the operating cycle in days (*|OpCycleAdj|*), the volatility of operating cash flows and sales revenues (*|StdOpCFAdj|*, *|StdSalesAdj|*), the nature of operation (*|CapIntAdj|*), and *|ZscoreAdj|* as a control for firms in financial distress. Further, *|RoAAdj|*, *|BTMAdj|*, *|LeverageAdj|*, and *BigFour* are included as additional controls.

With regard to the binary variable *BigFour*, Francis et al. (2014) suggest that firms audited by the same Big Four auditor are subject to the same audit approach and process. This in turn results in similar application and judgment of accounting policies as well as

similar accrual adjustments. Balsam et al. (2003) show that audit quality restricts managers from engaging in future earnings management activities. Moreover, Francis et al. (1999) posit that the former Big Six (nowadays Big Four) auditors are effectively constraining their clients to manage accruals. Against this background, the external auditor plays an important role regarding the earnings quality (see section 2.2.5.2). Consequently, it is expected that audit quality influences the dependent variables of this research. This is why the present PhD thesis aims to control for the type of auditor when studying the effect of similar notes on the implementation of earnings management. Each variable and its measurement are explained in more detail in the "Variable descriptions" included as Appendix 3 to this research.

To support the statistical findings of the first hypothesis test, additional F-test and t-test were conducted. Both tests of significance were explained in the preceding section. The following illustrated table 7 presents the results from t-test in parentheses below coefficients. The robust t-statistics demonstrate that each of the regression coefficients, considered separately, is secured against $\beta_1 = 0$ and $\beta_2 = 0$ and […] $\beta_{12} = 0$.

However, the t-test does not prove if the entire set of regression coefficients in the model is collectively different from zero. Due to this fact, it is additionally tested if the following null hypothesis (H_0) can be rejected by conducting an additional F-test. The null hypothesis is an equation that includes not only one, but multiple regression coefficients. It asserts that the explanatory variables (β_1 till β_{12}) of the model are jointly not significant. H_0 is tested as follows:

$$H_0 : \beta_1 = \beta_2 = ... = \beta_{12} = 0$$

where β_1 till β_{12} includes either *SimilarityAccPol_lag* or *SimilarityRevRec_lag* and all the control variables as presented on the left-hand column in table 7 below. The β_0 is not included by H_0. This is due to the fact that β_0 means the intercept and only the influence of variables on the slope of the regression line is tested to prove if the independent variables adopted by the model improves the fit.

If the null hypothesis cannot be rejected, there would be no significant effect caused by the full set of included variables. In contrast, the alternative hypothesis (H_a) asserts that at least one of the regression coefficients in the model is different from zero. This in turn would support the significance of used variables in explaining earnings quality as measured by absolute discretionary accruals.

162

Therefore, H$_a$ is developed as follows:

$$H_a: \beta_i \neq 0 \; for \; at \; least \; one \; i = 1,2,\dots,12$$

The results from testing the first hypothesis including both tests of significance are presented in table 7 below. Three specifications are presented for each of the both lagged similarity scores of the notes *SimilarityAccPol_lag* and *SimilarityRevRec_lag*. Thus, the results listed for (1) till (3) relate to *SimilarityAccPol_lag*, while (4) till (6) only refer to *SimilarityRevRec_lag*. The first specification only contains the variables of interest. This means (1) and (4) only contain the both similarity scores. The second specification, thus (2) and (5), includes all control variables that should explain differences in the dependent variable (*AbsDAC*), excluding the *Ind_acctcomp* by De Franco et al. (2011). This exclusion is due to the fact that the output-based accounting comparability indicator is based on earnings itself (Peterson et al., 2015). Thus, it might not be appropriate to explore the earnings quality. Nevertheless, it should be tested if the adopted research approach can partially explain accounting comparability. Therefore, the third specification in table 7 comprises the full set of variables that are expected to influence the unsigned discretionary accruals as the dependent variable of this research.

The measurement uses standard errors clustered by firm to adjust for firm-level correlation over time. Further, the model 10 (or presented separately for both similarity scores in 11 and 12) includes industry-year fixed effects. These are based on the two-digit SIC code. The fixed effects should avoid that changes in the sample over time of included sample period and across industries influence the results. For instance, the business environment of an industry may be changed from the previous year. Also, new disclosure requirements and adjustments of accounting standards can lead to changes in the accounting policy and revenue recognition disclosures. Finally, this PhD thesis holds constant the annual economic changes. As explained above, robust t-statistics are shown in parentheses below coefficients in the following illustrated table 7. Adjusted R-squared and F-statistics are used to test the significance of the included variables in explaining accrual-based earnings management.

Table 7: The effect of similarity of the notes to the accounts on absolute discretionary accruals

Variables	Dep. Var = AbsDAC			Dep. Var = AbsDAC		
	(1)	(2)	(3)	(4)	(5)	(6)
SimilarityAccPol_lag	-1.805***	-0.970***	-0. 962***			
	(-8.21)	(-5.53)	(-5.09)			
SimilarityRevRec_lag				-1.692***	-0.740***	-0.695***
				(-7.18)	(-4.52)	(-4.28)
Ind_acctcomp_lag			-0.019***			-0.011**
			(-5.12)			(-2.80)
|SizeAdj|		-0.004**	-0.003**		-0.005**	-0.003**
		(-2.77)	(-2.59)		(-2.81)	(-2.64)
|RoAAdj_lag|		0.138***	0.105***		0.117***	0.146***
		(5.06)	(3.97)		(4.29)	(5.80)
|BTMAdj|		-0.017*	-0.011*		-0.014*	-0.010*
		(-1.83)	(-1.65)		(-1.78)	(-1.63)
|LeverageAdj|		0.031*	0.010*		0.022*	0.008*
		(1.93)	(1.63)		(1.83)	(1.60)
|OpCycleAdj|		0.000*	0.000*		0.000*	0.000*
		(1.71)	(1.95)		(1.76)	(1.98)
|StdOpCFAdj|		0.372**	0.251**		0.409**	0.007**
		(2.94)	(2.73)		(2.99)	(2.59)
|StdSalesAdj|		0.241**	0.085**		0.298**	0.062**
		(2.70)	(2.49)		(2.91)	(2.37)
|CapIntAdj|		-0.058	-0.011		-0.046	-0.079
		(-1.29)	(-0.30)		(-1.08)	(-1.54)
|ZscoreAdj|		0.012**	0.009*		0.013**	0.007*
		(2.81)	(1.77)		(2.96)	(1.75)
BigFour		-0.086**	-0.059**		-0.073**	-0.050**
		(-2.97)	(-2.61)		(-2.88)	(-2.45)
Constant	0.618***	0.209***	0.192***	0.488***	0.153***	0.243***
	(14.03)	(7.58)	(4.25)	(12.90)	(4.17)	(5.49)
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	1,447	1,447	1,447	1,447	1,447	1,447
F-value	12.59***	5.60***	5.21***	7.13***	4.28***	4.16***
Adjusted R-squared	0.322	0.697	0.404	0.305	0. 571	0.294

See Appendix 3 for variable definitions. An intercept was included in each model. ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 levels.

The results in table 7 for the **<u>first specification (1) and (4)</u>** show that the coefficients of lagged *SimilarityAccPol* and *SimilarityRevRec_lag* are significantly negative from zero (p-values less than 0.01). The coefficient of *SimilarityAccPol* on *AbsDAC* is -1.805 (with a t-value of -8.21) and the coefficient for *SimilarityRevRec* is -1.692 (with a t-value of -7.18). These results are consistent with the first hypothesis of this PhD thesis. Firms with more similar notes of the previous year conduct less accrual-based earnings management activities in the following fiscal year. From this it follows that there is a lower earnings quality amongst firms with less similar notes compared to industry peers. As shown in table 7, the coefficients of *SimilarityAccPol_lag* and *SimilarityRevRec_lag* in the first specification are more negative than the results presented for the second and third specification. This demonstrates the clear negative correlation between the both variables of interest (*SimilarityAccPol* and *SimilarityRevRec*) and earnings management.

Further, the **<u>second specification (2) and (5)</u>** presents coefficients for all control variables, excluding the *Ind_acctcomp* by De Franco et al. (2011). As expected, there are stronger effects of *SimilarityAccPol_lag* and *SimilarityRevRec_lag* if the accounting comparability indicator is excluded. Although there are statistically significant results in the second and third specification, the coefficients for both similarity scores are more negative in the second one. While the coefficient of *SimilarityAccPol* on *AbsDAC* is -0.970 (with a t-value of -5.53) in the second specification, there is a lower one of -0.962 (with a t-value of -5.09) in the third specification. Similar to this, the coefficient of *SimilarityRevRec* on *AbsDAC* is -0.740 (with a t-value of -4.52) in the second specification and -0.695 (with a t-value of -4.28) in the third specification. These results show that the adopted research approach is not appropriate to fully explain accounting comparability. This corresponds with the results of the validation test in table 6 that does not show any significant effects of *Ind_acctcomp* on both similarity scores. Although the similarity of the notes is partially related to accounting comparability, the empirical results imply that the association between the both similarity scores and earnings quality cannot control for accounting comparability. Despite this fact the inclusion of variable *Ind_acctcomp* in the following discussed third specification ensures that the model considers all key factors that might explain earnings quality as measured by absolute discretionary accruals.

Finally, the **third specification (3) and (6)** includes all variables and control variables. As explained in the preceding paragraph, there are less strong effects of *SimilarityAccPol_lag* and *SimilarityRevRec_lag* when including *Ind_acctcomp* in the equation. However, both similarity scores remain significantly negative (with t-values of -4.52 and -4.28). In conclusion, the coefficients of lagged *SimilarityAccPol* and *SimilarityRevRec_lag* that are presented in table 7, are negative and significant with p-values less than 0.01 in all three specifications. Neither the inclusion of additional variables that might influence the earnings quality nor controlling for accounting comparability changes this conclusion. Hence, the empirical findings of this research are robust for all three specifications. This collectively supports the hypothesis of this research that firms with more similar notes of the previous year conduct less accrual-based earnings management activities in the following fiscal year.

As outlined at the beginning of this section, both similarity scores are lagged by one year in order to mitigate endogeneity concerns. However, for the purpose of testing the robustness of research results, the regression was rerun by including contemporaneous similarity scores of the notes instead of the lagged scores *SimilarityAccPol_lag* and *SimilarityRevRec_lag*. The untabulated results show that coefficients for *SimilarityAccPol* and *SimilarityRevRec* are all negative and significant with p-values less than 10 percent. In comparison to the reported findings in table 7, using contemporaneous similarity scores leads to less significant results. However, this was expected and complies with the developed theory for the hypotheses in section 4.1. There are the following endogeneity concerns regarding the association between textual similarities in the notes and earnings quality. Both the content of the notes and decision about earnings management activities are most likely jointly determined by the management (Lang and Stice-Lawrence, 2015). Therefore, this research adopts lagged similarity scores in order to control for these endogeneity concerns. The robustness check above confirms that using contemporaneous similarity scores is less appropriate to explore the association between similarities of the notes and earnings management.

Concerning the choice of similarity measure between the full set of accounting policy and revenue recognition disclosures, the results in table 7 suggest that both note scores capture earnings quality. Overall, the findings of this PhD thesis show less significant results when similarity of the notes is measured using revenue recognition disclosures. As presented in table 7 above, there are F-statistics of 12.59, 5.60 and 5.21 for *Similar-*

ityAccPol and of 7.13, 4.28 and 4.16 for *SimilarityRevRec*. Further, the R-squares in specifications (1) till (3) are more significant than the ones presented in (4) till (6). This indicates that a larger range of aggregated accounting policies is better suited for explaining differences in abnormal levels of accruals. There are various ways offered under US GAAP to influence the accruals. The variable *SimilarityAccPol* includes the entire textual accounting policies such as inventory policy, revenue recognition, or depreciation and amortization methods. In contrast, *SimilarityRevRec* only contains the revenue recognition. Due to this fact, an aggregate similarity score of accounting choices compared to a single accounting policy, such as, for example, revenue recognition, fits better to explore the association between similarities in the notes and earnings management. This complies with the reported coefficients in table 7 that show stronger effects for *SimilarityAccPol_lag*. However, these results should be interpreted carefully, as including SimilarityRevRec_lag might lead to additional benefits. This stems from the fact that detail tagging of significant accounting policies from different sections of the notes provides different information about the earnings quality. This would not support the claim that examining the full set of accounting policy disclosures is better suited to study the effect of similarity of the notes to the accounts on earnings management behaviour by firms.

In order to validate the test results, the analyses of relationship between the similarity of the notes and accrual-based earnings management are additionally rerun by measuring the discretionary accruals with another proxy beside the modified Jones Model. Indeed, the validation test uses the performance adjusted modified Jones Model according to Kothari et al. (2005). Their model utilizes the return on asset (ROA) as a proxy to consider the financial performance of a firm for measurement of discretionary accruals. The untabulated results for *SimilarityAccPol_lag* and *SimilarityRevRec_lag* are similar to those presented in table 7. The coefficients of both similarity scores remain negative and statistically significant on at least the 5 percent level (p-value 0.05). Thus, there is also a negative effect of *SimilarityAccPol* and SimilarityRevRec on performance adjusted discretionary accruals. From this it can be followed that alternative measurement of discretionary accruals does not change the inferences of the first hypothesis test.

With regard to the control variables included in the second and third specification of the equation, the coefficients presented in table 7 are consistent with the developed theory for the hypotheses in section 4.1. According to the review of previous literature, it was

expected that there is an impact on the earnings quality by the included variables listed on the left-hand column of table 7. That is, earnings management as proxied by *AbsDAC* decreases with a higher degree of accounting comparability. Indeed, the coefficients for *Ind_acctcomp* are significantly different from zero at the 1 percent level in specification (3) and at the 5 percent level in specification (6). Thus, firms with a higher degree of accounting comparability reduce their accrual-based earnings management activities. This corresponds with the findings of Peterson et al. (2015). Further, there is also a positive influence on accruals quality by industry-adjusted firm size (*|SizeAdj|*). The negative and statistically significant coefficients (p-values less than 0.05) imply that bigger firms conduct less accrual-based earnings management activities. In contrast, there is a higher propensity for accrual-based earnings management activities amongst firms with a better performance in comparison to industry peers. A firm's performance is measured by industry-adjusted return on assets. However, the relation between the variable |RoAAdj| and earnings management might be endogenous. This is due to the fact that firms with different levels of performance should have different incentives to manage earnings upwards or downwards. Firms might want to beat contemporaneous levels of return on assets. Thus, the industry-adjusted variable |RoAAdj| is lagged by one year in order to control for endogeneity. The results for |RoAAdj_lag| in table 7 demonstrate a clear positive correlation at significance of 1 percent. Thus, it can be concluded that firms with a higher profitability in the previous year are more likely to conduct accrual-based earnings management in the current year. Also, there is an increased propensity to engage in accrual-based earnings management amongst growth firms as outlined by Dichev and Li (2013). These firms have a lower book-to-market ratio. As expected, the coefficients of *|BTMAdj|* are negative and significant with p-values less than 10 percent. Moreover, a higher leverage should negatively influence the earnings quality. By drawing on the findings of Anagnostopoulou and Tsekrekos (2017), it is expected that a high leverage indicates financial destress of a sample firm. This in turn increases the propensity for earnings management activities. Indeed, the results in table 7 confirm this expectation by positive and statistically significant coefficients (p-values less than 0.10) for *|LeverageAdj|*. The variable operating cycle is used a common proxy for low accruals' quality by previous research (e.g. Dechow and Dichev, 2002). The empirical results of this PhD thesis demonstrate that the length of the operating cycle is positively related to accrual-based earnings management. The coefficients for *|OpCycleAdj|* are significantly different from zero with p-values less than 10 per-

cent. Further, the discretionary accruals increase with industry-adjusted higher volatility of revenue (|*StdSalesAdj*|) and operating cash flows (|*StdOpCFAdj*|). The coefficients for both variables are positive and significant with p-values less than 5 percent. The reported positive correlation is in accordance with the early research of Dechow and Dichev (2002). In addition, their study points out a further indicator for accrual-based earnings management. This relates to capital intensity which should cause higher magnitudes of total accruals through depreciations and impairment of fixed assets. However, this PhD thesis does not obtain any confirming results for this claim by inclusion of industry-adjusted variable for capital intensity. The results for |*CapIntAdj*| in table 7 are negative and statistically not significant. This implies that the capital intensity has no significant impact on the discretionary accruals within the analyzed data sample. In contrast, financial distress leads to increasing discretionary accruals. The coefficients for (|*ZscoreAdj*|) are positive and significant at a level of at least less than 10 percent. In accordance with the assumptions of this research, Big Four auditors seem to effectively restrict accrual-based earnings management. The coefficients in table 7 are negative and statistically significant with p-values less than 0.05 in both specifications. The validation of the adopted similarity scores showed that audit quality also increases the similarity of the notes as presented in table 6. Therefore, the auditor choice is an important factor for both disclosure quality and earnings quality.

Overall, the test results suggest that higher within-industry similarity of the notes measured by *SimilarityAccPol* and *SimilarityRevRec* is negatively associated with future earnings management activities. The test results presented in table 7 are consistent with the first hypothesis. The significance of these results is confirmed by F-values presented at the bottom row of table 7. This collectively supports the first hypothesis of this research that firms with more similar notes of the previous year engage in less accrual-based earnings management activities in the following fiscal year. Therefore, users of financial statements might turn their attention to the application of alternative accounting policies of firms within a particular industry, which are not selected by peer firms, as it explains whether these firms have greater flexibility to manage accruals in the future. Also, the empirical findings approve that XBRL is an appropriate data source for comparability research and within the scope of this study for measurement of textual similarity.

6.6 Similarity of the Financial Notes to the Accounts and Real Earnings Management

This section explains and discusses the second hypothesis test of this research. For this purpose, the effect of similar notes on a firm's propensity to manipulate real activities is analyzed. This should prove if the adopted similarity scores are correlated with real earnings management activities. Signed discretionary expenses and abnormal production costs as well as an aggregated real earnings management proxy are used to measure real earnings management. In result, the second hypothesis is tested by using three alternative dependent variables. Each of the included proxies should represent a unique aspect of real earnings management. The results of the three alternative tests are illustrated separately in Panel A, B and C.

As opposed to accrual-based earnings management, this research identifies mostly earnings increasing manipulation of real activities by cutting discretionary expenses such as R&D costs or by overproducing inventory. By doing this, firms aim to report lower costs of goods sold. Therefore, a certain direction of influenced earnings can be expected for real earnings management. From this it can be followed that signed real earnings management proxies are appropriate to measure these income-increasing activities.

In order to control for variables that should explain variations of dependent variables, several control variables are included by the equation below. Indeed, this research takes into account that there are other firm characteristics beside *SimilarityAccPol* and *SimilarityRevRec* that can cause variations of dependent variables in model 13. By doing so, this research relies on Peterson et al. (2015) and Ashbaugh-Skaife et al. (2008) who also included several control variables in their study.

As in Peterson et al. (2015), the included control variables with Adj suffixes are industry-adjusted by subtracting the median value of all firms in the same two-digit SIC code and year. This adjustment should ensure that abnormal results or variability compared to the industry-year median do not influence the inferences in this research. It is a common method to control for effects by firm-specific outliers which was also adopted by previous research (Ashbaugh-Skaife et al., 2008; Francis, 2004). As outlined above, signed dependent variables are used to measure real earnings management in this research. Due to this fact, it also utilizes signed control variables. Each of the adopted control variable

and its measurement are explained in more detail in the "Variable descriptions" included as Appendix 3 to this research.

The following equation is estimated:

(13)

$$Dep_{it} = \beta_0 + \beta_1 SimiliarityNote_{i,t-1} + \beta_2 IndAcctcomp_{i,t-1} + \beta_3 SizeAdj_{i,t}$$
$$+ \beta_4 RoAAdj_{i,t.1} + \beta_5 BTMAdj_{i,t} + \beta_6 LeverageAdj_{i,t}$$
$$+ \beta_7 OpCycleAdj_{i,t} + \beta_8 StdOpCFAdj_{i,t} + \beta_9 StdSalesAdj_{i,t}$$
$$+ \beta_{10} CapIntAdj_{i,t} + \beta_{11} ZscoreAdj_{i,t} + \beta_{12} BigFour_{i,t} + \varepsilon_i$$

where for fiscal year t and firm i, *DEP* represents either the combined proxy *REM* or the two individual real earnings management proxies *Abdisx* and *Abprod*. The independent variable *SimilarityNote* denotes the both similarity scores of the notes, either the full set of accounting policy disclosures *SimilarityAccPol* or the revenue recognition disclosures *SimilarityRevRec*. Therefore, the estimated equation (13) can be separated into the following two equations:

(14)

$$Dep_{it} = \beta_0 + \beta_1 SimiliarityAccPol_{i,t-1} + \beta_2 IndAcctcomp_{i,t-1} + \beta_3 SizeAdj_{i,t}$$
$$+ \beta_4 RoAAdj_{i,t.1} + \beta_5 BTMAdj_{i,t} + \beta_6 LeverageAdj_{i,t}$$
$$+ \beta_7 OpCycleAdj_{i,t} + \beta_8 StdOpCFAdj_{i,t} + \beta_9 StdSalesAdj_{i,t}$$
$$+ \beta_{10} CapIntAdj_{i,t} + \beta_{11} ZscoreAdj_{i,t} + \beta_{12} BigFour_{i,t} + \varepsilon_i$$

(15)

$$Dep_{it} = \beta_0 + \beta_1 SimiliarityRevRec_{i,t-1} + \beta_2 IndAcctcomp_{i,t-1} + \beta_3 SizeAdj_{i,t}$$
$$+ \beta_4 RoAAdj_{i,t.1} + \beta_5 BTMAdj_{i,t} + \beta_6 LeverageAdj_{i,t}$$
$$+ \beta_7 OpCycleAdj_{i,t} + \beta_8 StdOpCFAdj_{i,t} + \beta_9 StdSalesAdj_{i,t}$$
$$+ \beta_{10} CapIntAdj_{i,t} + \beta_{11} ZscoreAdj_{i,t} + \beta_{12} BigFour_{i,t} + \varepsilon_i$$

The coefficients on *SimilarityAccPol* and *SimilarityRevRec* are the test of second hypothesis. This research takes the assumption that more similar accounting policy and revenue recognition disclosures should restrict firms from engaging in real earnings management. Thus, a negative sign of coefficients for both similarity scores are predicted for the results.

A Taylor expansion for note length is used to adjust both similarity scores *SimilarityAccPol* and *SimilarityRevRec*. As explained in section 5.2, this modification is required to ensure reliable research results since document length influences the raw similarity sores. The study of Brown and Tucker (2011) also used this approach to control for the automatic increase of similarity scores through longer text documents. However, all tests in this research were rerun by using raw scores. By doing so, it is ensured that the results and conclusions are not only based on this adjustment. The untabulated results from replacing the adopted similarity scores with unadjusted raw similarity scores show that there remain strong effects. Hence, the inferences drawn in this PhD thesis are not constructed through Taylor expansion for note length.

In line with theory, this PhD thesis follows Zang (2012) by assuming that real earnings management can occur during the entire fiscal year and precedes accrual-based earnings management. Both of the similarity scores of the notes are lagged to test the hypothesis of whether better accounting information quality through similar notes negatively influences firms' willingness to engage in income-increasing real earnings management. Furthermore, lagging the independent variable mitigates the following endogeneity concerns regarding the association between textual similarities in the notes and earnings quality. Both the content of the notes and decision about earnings management activities are most likely jointly determined by the management. Further, there is another endogeneity issue regarding the output-based accounting comparability indicator by De Franco et al. (2011). It is based on the earnings themselves. Consequently, there is a risk that the effects shown for the variable *Ind_acctcomp* in the hypothesis test are caused through this endogenous relationship. Therefore, this research adopts lagged similarity scores in order to control for these endogeneity concerns. Both of the similarity scores *SimilarityAccPol* and *SimilarityRevRec* and the variable *Ind_acctcomp* are lagged by one year. The robustness check performed in the preceding section demonstrated that using contemporaneous similarity scores is less appropriate to explore the association between similarities of the notes and earnings management.

To support the statistical findings of the second hypothesis test, additional F-test and t-test were conducted. Both tests of significance were explained earlier in section 6.4 of this chapter. The following illustrated panels A till C of table 8 presents the results from t-test in parentheses below coefficients. The robust t-statistics demonstrate that each of

the regression coefficients, considered separately, is secured against $\beta_1 = 0$ and $\beta_2 = 0$ and […] $\beta_{12} = 0$.

However, the t-test does not prove if the entire set of regression coefficients in the model is collectively different from zero. Due to this fact, it is additionally tested if the following null hypothesis (H_0) can be rejected by conducting an additional F-test. The null hypothesis is an equation that includes not only one, but multiple regression coefficients. It asserts that the explanatory variables (β_1 till β_{12}) of the model are jointly not significant. H_0 is tested as follows:

$$H_0: \beta_1 = \beta_2 = \ldots = \beta_{12} = 0$$

where β_1 till β_{12} includes either *SimilarityAccPol_lag* or *SimilarityRevRec_lag* and all the control variables as presented on the left-hand column in table 8 below. The β_0 is not included by H_0. This is due to the fact that β_0 means the intercept and only the influence of variables on the slope of the regression line is tested to prove if the independent variables adopted by the model improves the fit.

If the null hypothesis cannot be rejected, there would be no significant effect caused by the full set of independent variables. In contrast, the alternative hypothesis (H_a) asserts that at least one of the regression coefficients in the model is different from zero. This in turn would support the significance of used variables in explaining earnings quality as measured by real earnings management proxies.

Therefore, H_a is developed as follows:

$$H_a: \beta_i \neq 0 \; for \; at \; least \; one \; i = 1,2,\ldots,12$$

The results from testing the second hypothesis including both tests of significance are presented in table 8 below. In the same manner as in the first hypothesis test, there are three specifications. Thus, the results for both similarity scores of the notes in table 8 are separated into six columns. The coefficients listed in (1) till (3) relate to *SimilarityAccPol_lag*, while (4) till (6) only refer to *SimilarityRevRec_lag*. As outlined in the preceding section, the first specification only contains the variables of interest. This means (1) and (4) only contain the both similarity scores. The second specification, thus (2) and (5), includes all control variables that should explain differences in the dependent variable, excluding the *Ind_acctcomp* by De Franco et al. (2011). This exclusion is due to the fact that the output-based accounting comparability indicator is based on

173

earnings itself (Peterson et al., 2015). Thus, it might not be appropriate to explore the earnings quality. Nevertheless, it should be tested if the adopted research approach can partially explain accounting comparability. Therefore, the third specification in table 8 comprises the full set of variables that are expected to influence the dependent variables of this research.

As outlined at the beginning of this section, three different proxies are utilized to measure real earnings management. Thus, the second hypothesis test of this research includes three different dependent variables. First, an aggregated real earnings management measure is adopted as the dependent variable. The second version uses discretionary expenses such as R&D, SG&A, or advertising expenses. During a third and final alternative, real earnings management is measured by abnormal production costs. Each of the included proxies should represent a unique aspect of real earnings management.

The measurement uses standard errors clustered by firm to adjust for firm-level correlation over time. Further, the model 13 (or presented separately for both similarity scores in 14 and 15) includes industry-year fixed effects. These are based on the two-digit SIC code. The fixed effects should avoid that changes in the sample over time of included sample period and across industries influence the results. For instance, the business environment of an industry may be changed from the previous year. Also, new disclosure requirements and adjustments of accounting standards can lead to changes in the accounting policy and revenue recognition disclosures. Finally, this PhD thesis holds constant the annual economic changes. As explained above, robust t-statistics are shown in parentheses below coefficients in the following illustrated table 8. Adjusted R-squared and F-statistics are presented on the bottom row of the table. Adjusting the R-squares is a commonly used and appropriate method that provides accurate results (Lind et al., 2015). Both the R-squares and results from F-test support the statistical significance of the findings about the relationship between textual similarities of the notes and the implementation of real earnings management activities as presented in the following.

Table 8, Panel A: The effect of similarity of the notes to the accounts on real earnings management as measured by an aggregated proxy

	Dep. Var = REM			Dep. Var = REM		
Variables	(1)	(2)	(3)	(4)	(5)	(6)
SimilarityAccPol_lag	-2.330***	-1.573***	-0.081***			
	(-7.65)	(-5.61)	(-3.17)			
SimilarityRevRec_lag				-2.155***	-1.309***	-0.074***
				(-6.53)	(-4.18)	(-3.05)
Ind_acctcomp_lag			0.013**			0.009**
			(2.92)			(2.66)
SizeAdj		0.016*	0.025*		0.019*	0.031*
		(1.70)	(1.91)		(1.83)	(1.98)
RoAAdj_lag		0.227**	0.465**		0.219**	0.404**
		(2.89)	(2.93)		(2.76)	(2.92)
BTMAdj		-0.091*	-0.188*		-0.135*	-0.287*
		(-1.77)	(-1.92)		(-1.84)	(-1.98)
LeverageAdj		0.190*	0.272*		0.219*	0.328*
		(1.93)	(1.98)		(1.92)	(2.01)
OpCycleAdj		0.007**	0.001**		0.002**	0.001**
		(2.64)	(2.33)		(2.58)	(2.30)
StdOpCFAdj		0.736**	0.580**		0.951**	0.779**
		(2.83)	(2.71)		(2.97)	(2.92)
StdSalesAdj		0.082*	0.017*		0.266*	0.057*
		(1.69)	(1.62)		(1.95)	(1.64)
CapIntAdj		1.104***	0.970***		0.965***	0.983***
		(7.81)	(7.65)		(6.74)	(7.07)
ZscoreAdj		0.003*	0.005*		0.002*	0.003*
		(1.65)	(1.72)		(1.60)	(1.67)
BigFour		0.051**	0.083**		0.090**	0.125**
		(2.47)	(2.51)		(2.58)	(2.73)
Constant	0.727***	-0.146***	-0.085**	0.623***	0.190***	-0.072**
	(14.59)	(-3.20)	(-2.17)	(14.06)	(4.19)	(-2.04)
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	1,447	1,447	1,447	1,447	1,447	1,447
F-value	8.52***	5.69***	3.24***	6.35***	3.90***	1.76***
Adjusted R-squared	0.300	0.462	0.581	0.298	0.409	0.533

See Appendix 3 for variable definitions. An intercept was included in each model. ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 levels.

Panel A of table 8 shows the results for all three specifications when utilizing an aggregated real earnings management measure to proxy for real earnings management. Firms might use various techniques of real earnings management and an aggregated proxy might reduce measurement errors in each variable.

The results for the **<u>first specification (1) and (4)</u>** show that the coefficients of lagged *SimilarityAccPol* and *SimilarityRevRec_lag* are significantly negative from zero (p-values less than 0.01). The coefficient of *SimilarityAccPol* on *REM* is -2.330 (with a t-value of -7.65) and the coefficient for *SimilarityRevRec* is -2.155 (with a t-value of -6.53). These results are consistent with the second hypothesis of this PhD thesis. Firms with more similar notes of the previous year engage in less real earnings management activities in the following fiscal year. Thus, more similar notes improve the earnings quality measured by the aggregated real earnings management proxy. As shown in table 8, the coefficients of *SimilarityAccPol_lag* and *SimilarityRevRec_lag* in the first specification are more negative than the results presented for the second and third specification. This demonstrates the clear negative correlation between the both variables of interest and real earnings management.

Further, the **<u>second specification (2) and (5)</u>** presents coefficients for all control variables, excluding the *Ind_acctcomp* by De Franco et al. (2011). As expected, there are stronger effects of *SimilarityAccPol_lag* and *SimilarityRevRec_lag* if the accounting comparability indicator is excluded. While the coefficient of *SimilarityAccPol* on *REM* is -1.573 (with a t-value of -5.61) in the second specification, there is a lower one of -0.081 (with a t-value of -3.17) in the third specification. Similar to this, the coefficient of *SimilarityRevRec* on *REM* is -1.309 (with a t-value of -4.18) in the second specification and -0.074 (with a t-value of -3.05) in the third specification. Although there are statistically significant results in the second and third specification, the coefficients for both similarity scores are more negative in the second one. These results show that the adopted research approach of this PhD thesis is not appropriate to fully explain accounting comparability as measured by De Franco et al. (2011). Despite this fact the inclusion of variable *Ind_acctcomp* in the following discussed third specification ensures that the model considers all key factors that might explain earnings quality as measured by real earnings management proxies.

Finally, the **third specification (3) and (6)** includes all variables and control variables. In contrast to the second specification, the accounting comparability measure by De Franco et al. (2011) is added to the regression model 13 (or presented separately for both similarity scores in 14 and 15). Although there are less strong effects of *SimilarityAccPol_lag* and *SimilarityRevRec_lag* when including *Ind_acctcomp*, both similarity scores remain significantly negative as outlined in the preceding paragraph. In conclusion, the coefficients of lagged *SimilarityAccPol* and *SimilarityRevRec_lag* that are presented in table 8, are negative and significant with p-values less than 0.01 in all three specifications. Neither the inclusion of additional variables that might influence the earnings quality nor controlling for accounting comparability changes this conclusion. Hence, the statistical findings of this research are robust for all three specifications. The significance of the results is confirmed by F-values presented at the bottom row. This collectively supports the second hypothesis of this research that firms with more similar notes of the previous year engage in less real earnings management activities in the following fiscal year.

Overall, the findings of this PhD thesis show less significant results when similarity of the notes is measured using revenue recognition disclosures. As presented in table 8 (Panel A) above, there are F-statistics of 8.52, 5.69 and 3.24 for *SimilarityAccPol* and of 6.35, 3.90 and 1.76 for *SimilarityRevRec*. Further, the R-squares in specifications (1) till (3) are more significant than the ones presented in (4) till (6). This indicates that a larger range of aggregated accounting policies is better suited for explaining differences in earnings quality as measured by real earnings management proxies. This was expected since there are various real cash flow decisions that can influence the earnings.

Beside the aggregated real earnings management measure, there are further two dependent variables for the second hypothesis test. The majority of previous research focused on the measurement of accrual-based earnings management to assess earnings quality. Consequently, there is less empirical evidence about the effects of real cash flow decisions. Therefore, this PhD thesis adopts three different real earnings management proxies in order to avoid any random or biased results. The results for using either discretionary expenses or abnormal production costs as the dependent variable are presented in the following Panel B and C of table 8.

Table 8, Panel B: The effect of similarity of the notes to the accounts on real earnings management as measured by discretionary expenses

Variables	Dep. Var = Abdisx			Dep. Var = Abdisx		
	(1)	(2)	(3)	(4)	(5)	(6)
SimilarityAccPol_lag	-2.310***	-1.287**	-1.039**			
	(-7.29)	(-2.90)	(-2.49)			
SimilarityRevRec_lag				-1.374***	-1.251**	-1.026**
				(-5.21)	(-2.63)	(-2.27)
Ind_acctcomp_lag			0.011**			0.008**
			(2.79)			(2.56)
SizeAdj		0.012*	0.017*		0.014*	0.019*
		(1.64)	(1.81)		(1.65)	(1.93)
RoAAdj_lag		0.416**	0.653**		0.483**	0.604**
		(2.93)	(3.07)		(2.96)	(3.03)
BTMAdj		-0.059*	-0.074*		-0.058*	-0.161*
		(-1.62)	(-1.68)		(-1.60)	(-1.89)
LeverageAdj		0.183*	0.219*		0.270*	0.225*
		(1.90)	(1.93)		(2.02)	(1.95)
OpCycleAdj		0.011**	0.001**		0.003**	0.001**
		(2.93)	(2.35)		(2.62)	(2.37)
StdOpCFAdj		0.522**	0.427**		0.839**	0.752**
		(2.69)	(2.63)		(2.94)	(2.90)
StdSalesAdj		0.385*	0.162*		0.359*	0.087*
		(2.06)	(1.78)		(2.02)	(1.61)
CapIntAdj		0.837***	0.685***		0.730***	0.749***
		(6.41)	(4.92)		(5.64)	(5.95)
ZscoreAdj		0.011*	0.013*		0.010*	0.005*
		(1.72)	(1.76)		(1.67)	(1.60)
BigFour		0.089**	0.120**		0.107**	0.106**
		(2.54)	(2.69)		(2.64)	(2.59)
Constant	0.539***	-0.152**	-0.171**	0.490***	0.102**	0.035*
	(13.50)	(-2.47)	(-2.63)	(13.08)	(2.41)	(1.79)
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	1,447	1,447	1,447	1,447	1,447	1,447
F-value	7.29***	1.51**	1.33**	5.40***	1.41**	1.32**
Adjusted R-squared	0.311	0.385	0.458	0.309	0.291	0.431

See Appendix 3 for variable definitions. An intercept was included in each model. T-statistics are listed in parentheses below coefficients. ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 levels.

In the same manner as in the first alternative that uses an aggregated real earnings management measure, there are three specifications for each of the both lagged similarity scores. The coefficients for *SimilarityAccPol_lag* and *SimilarityRevRev_lag* in the **first specification (1) and (4)** are negative and statistically significant at a level of less than 5 percent when using discretionary expenses as dependent variable in the regression model. The coefficient of *SimilarityAccPol* on *Abdisx* is -2.310 (with a t-value of -7.29) and the coefficient for *SimilarityRevRec* is -1.374 (with a t-value of -5.21). Thus, the level of significance decreased compared to the first alternative. However, this was expected and complies with the developed theory for the second hypothesis in section 4.2. There are multiple real cash flow decisions which can be used by firms to influence their earnings. Discretionary expenses capture only one aspect of real earnings management. Consequently, the statistical probability of a significant correlation between the independent and the dependent variable is lower than in case of an aggregated real earnings management measure. Nevertheless, the alternative test shows that similar notes restrict firms from cutting discretionary expenses in order to manage the earnings upwards.

In the **second specification (2) and (5)** all control variables, excluding *Ind_acctcomp*, are added to the (discretionary expenses-) regression model. Similar to the results reported in Panel A, there are stronger effects of *SimilarityAccPol_lag* and *SimilarityRevRec_lag* if the accounting comparability indicator by De Franco et al. (2011) is excluded. While the coefficient of *SimilarityAccPol* on *Abdisx* is -1.287 (with a t-value of -2.90) in the second specification, there is a lower one of -1.039 (with a t-value of -2.49) in the third specification. Similar to this, the coefficient of *SimilarityRevRec* on *Abdisx* is -1.251 (with a t-value of -2.63) in the second specification and -1.026 (with a t-value of -2.27) in the third specification. Although the results presented for the second specification are less negative than for the first one, coefficients for *SimilarityAccPol_lag* and *SimilarityRevRev_lag* remain significantly negative from zero (p-values less than 0.05). The same is true for the **third specification (3) and (6)** when using discretionary expenses as the dependent variable. Including *Ind_acctcomp* in the third specification shows that even after controlling for accounting comparability there remains a strong effect of both similarity scores on the dependent variable. The coefficients listed in (3) and (6) of Panel B are negative and statistically significant at a level of less than 5 percent.

Overall, the results of Panel B are consistent with the statistical findings presented in Panel A. These are, the coefficients for *SimilarityAccPol_lag* and *SimilarityRevRev_lag* remain significantly negative from zero (p-values of at least less than 0.05) in all specifications and there are stronger effects when similarity of the notes is measured using *SimilarityAccPol*. The significance of these results is confirmed by F-statistics presented at the bottom row of table 8 (Panel B) on page 178. Therefore, it is concluded that using discretionary expenses as the dependent variable during the second hypothesis test does not change the inferences drawn in the first alternative of this test. In a third and final alternative, it is tested whether the similarity scores capture earnings quality when abnormal production costs are used as the dependent variable. The results of this alternative test of the second hypothesis are presented in Panel C as following.

Table 8, Panel C: The effect of similarity of the notes to the accounts on real earnings management as measured by abnormal production costs

	Dep. Var = Abprod			Dep. Var = Abprod		
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
SimilarityAccPol_lag	-1.082**	-0.957**	-0.869**			
	(-3.07)	(-2.81)	(-2.52)			
SimilarityRevRec_lag				-0.981**	-0.753**	-0.692*
				(-2.95)	(-2.18)	(-1.90)
Ind_acctcomp_lag			0.013**			0.011**
			(2.91)			(2.80)
SizeAdj		0.010*	0.014*		0.009*	0.012*
		(1.61)	(1.66)		(1.60)	(1.63)
RoAAdj_lag		0.319**	0.574**		0.325**	0.593**
		(2.90)	(2.99)		(2.91)	(3.01)
BTMAdj		-0.081*	-0.104*		-0.093*	-0.127*
		(-1.74)	(-1.79)		(-1.76)	(-1.82)
LeverageAdj		0.103*	0.159*		0.115*	0.190*
		(1.61)	(1.80)		(1.66)	(1.97)
OpCycleAdj		0.003**	0.001**		0.005**	0.002**
		(2.60)	(2.32)		(2.61)	(2.56)
StdOpCFAdj		0.294*	0.328*		0.361*	0.340*
		(1.90)	(1.98)		(2.09)	(2.01)
StdSalesAdj		0.109*	0.253*		0.140*	0.287*
		(1.73)	(1.89)		(1.76)	(2.01)
CapIntAdj		0.374**	0.351**		0.348**	0.322**
		(2.95)	(2.76)		(2.73)	(2.59)
ZscoreAdj		0.003*	0.007*		0.003*	0.005*
		(1.64)	(1.81)		(1.65)	(1.73)
BigFour		0.128**	0.079**		0.131**	0.084**
		(2.76)	(2.46)		(2.90)	(2.49)
Constant	0.182**	-0.167**	0.106**	0.175**	-0.073**	-0.057*
	(2.70)	(-2.54)	(2.42)	(2.68)	(-2.05)	(-1.83)
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	1,447	1,447	1,447	1,447	1,447	1,447
F-value	1.57**	1.46**	1.38**	1.49**	1.31**	1.25*
Adjusted R-squared	0.303	0.278	0.316	0.301	0.261	0.295

See Appendix 3 for variable definitions. An intercept was included in each model. T-statistics are listed in parentheses below coefficients. ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 levels.

There are several studies measuring real earnings management by abnormal production costs (Roychowdhury, 2006; Cohen et al., 2008). According to Roychowdhury (2006), firms reduce the costs of goods sold by increasing the production volume. Abnormal production costs are commonly used to influence the earnings upwards. Following this, the developed theory for the second hypothesis suggests that there is an effect of the adopted similarity scores on earnings quality as measured by abnormal production costs. The results in Panel C of table 8 are consistent with this expectation.

In the same manner as in the first and second alternative outlined above, there are three specifications for each of the both lagged similarity scores. While the coefficients for *SimilarityAccPol_lag* and *SimilarityRevRev_lag* are negative and statistically significant at a level of less than 5 percent in the first and second specification, there is a lower degree of significance (p-values less than 0.10) for *SimilarityRevRev_lag* in the third specification. There are coefficients for *SimilarityAccPol_lag* on *Abprod* of -1.082 (with a t-value of -3.07) in the first specification; and -0.957 (with a t-value of -3.07) in the second specification; and -1.082 (with a t-value of -3.07) in the third specification. Further, Panel C shows coefficients for *SimilarityRevRev_lag* on *Abprod* of -0.981 (with a t-value of -2.95) in the first specification; and -0.753 (with a t-value of -2.18) in the second specification; and -0.692 (with a t-value of -1.90) in the third specification. Thus, the statistical significance is lower than in the first alternative (as presented in Panel A of table 8). However, this complies with the expectations of this study since there are multiple real cash flow decisions which can be used by firms to influence their earnings. Abnormal production costs capture only one aspect of real earnings management. Due to this fact the statistical probability of a significant correlation between the independent and the dependent variable is lower than in case of an aggregated real earnings management measure. Also, *SimilarityAccPol* is slightly better to explain variations in earnings quality as measured by real earnings management proxies. Furthermore, the results from testing the first hypothesis as well as the first and second alternative of this test are also less significant in the third specification. As explained above, the less strong effects demonstrate that the adopted research approach cannot fully explain accounting comparability as measured by De Franco et al. (2011). Hence, the less significant results when including *Ind_acctcomp* in the third specification are consistent with the inferences drawn in this PhD thesis.

With regard to the control variables included in the second and third specification, the results in Panels A till C remain overall the same. These are, firms with a higher degree of accounting comparability engage in more real earnings management. The coefficients for the output-based *Ind_acctcomp* are positive and significant with p-values less than 5 percent in case all three dependent variables. These results are in line with theory and findings by Zang (2012), who suggests that firms turn to more real earnings management activities when the accounting information is more comparable. Further, there is a negative correlation between all three dependent variables and the industry-adjusted firm size variable (|*SizeAdj*|). The negative and statistically significant coefficients (p-values less than 0.10) demonstrate that bigger firms conduct less real earnings management activities. In contrast, firms with a higher profitability in the previous year conduct more real earnings management in the current year. As outlined in the preceding section, the industry-adjusted variable |RoAAdj| is lagged by one year. This is due to the fact that the relation between the firm's performance measured by |RoAAdj| and earnings management might be endogenous. The coefficients shown for |RoAAdj_lag| in Panel A, B and C are positive and significant with p-values less than 5 percent. Similar effects are shown for growth firms measured by lower book-to-market ratios. The coefficients of |BTMAdj| are negative and significant with p-values less than 10 percent. These results confirm the conclusions of Dichev and Li (2013) and Collins et al. (2017). Also, a higher leverage negatively influences the earnings quality as measured by real earnings management proxies. The results for |LeverageAdj| in table 8 are positive and statistically significant (p-values less than 0.10) in both specifications. This corresponds with the research of Anagnostopoulou and Tsekrekos (2017). Their findings show that a high leverage indicates financial destress which in turn increases the propensity for earnings management activities. Further, there is a positive correlation between the industry-adjusted length of the operating cycle and real earnings management. As shown in Panel A, B and C the coefficients for |OpCycleAdj| are significantly different from zero with p-values less than 5 percent. Further, there is a higher magnitude of real earnings management amongst firms with a volatile business environment. Table 8 shows positive coefficients for industry-adjusted higher volatility of revenue (|StdSalesAdj|) and operating cash flows (|StdOpCFAdj|). The results for |StdSalesAdj| are significant with p-values less than 10 percent in both specifications. While the coefficients for |StdOpCFAdj| are significantly positive with p-values less than 5 percent in Panels A and B, there is a lower level of significance (p-values less than 0.10) in Panel C. In con-

trast to the first hypothesis test, the empirical results from testing the second hypothesis show a positive correlation between capital intensity and earnings management. As presented in table 8, there is a significant effect of capital intensity on the earnings quality as measured by real earnings management proxies. The coefficients for |CapIntAdj| are positive and statistically significant with p-values at least less than 0.05 in case of all three included dependent variables. In the same vein, financial distress leads to higher magnitudes of real earnings management. The coefficients for (|ZscoreAdj|) are significantly positive (p-values less than 0.10) in both specifications. In accordance with the theory and findings by Chi et al. (2011), audit quality is related with higher levels of earnings management as measured by real earnings management. Firms turn to more real cash flow decisions when managing accruals is constrained by high-quality audits. By following many previous studies, high-quality audits are proxied by the binary variable *BigFour* (Chi et al., 2011; Zang, 2012). As presented in Panel A, B and C the coefficients for *BigFour* are positive and significantly different from zero with p-values less than 5 percent. In accordance with the study of Zang (2012), this demonstrates that managers implement more real earnings management activities if they are not able to use discretionary accruals without scrutiny of the auditor.

Concerning the choice of similarity measure between the full set of accounting policy and revenue recognition disclosures, the results in Panels A till C demonstrate that both note scores capture earnings quality. Overall, the second hypothesis test shows stronger effects for *SimilarityAccPol*. There are more significant R-squares and F-statistics in specifications (1) till (3) than in (4) till (6). Thus, a large range of aggregated accounting policies is more appropriate to explain variations in earnings quality as measured by real earnings management proxies. The less significant results for *SimilarityRevRec* are in line with the theory of Altamuro et al. (2005). They found out that accelerated revenue recognition is commonly used for accrual-based earnings management. Therefore, revenue recognition disclosures should be slightly better in explaining differences in abnormal levels of accruals and less appropriate to capture earnings quality as measured by real earnings management.

The substitutive use of accrual-based and real earnings management activities, which was outlined in section 2.2.1, is not subject of this PhD thesis. In comparison to other extant studies (e.g. Zang, 2012), this research does not only analyze firms that are likely to meet reporting goals. This study includes a range of firms with divergent incentives.

184

Therefore, it is not given whether the included sample firms aim to achieve certain earnings targets. As opposed to the research of Zang (2012), it cannot be presumed that sample firms use either accrual-based or real earnings management when their earnings are not high enough to comply with the agreed reporting goals. In conclusion, the adopted research approach does neither aim nor allow to study the substitutive relationship between accrual-based and real earnings management activities. As a consequence, the results from the empirical analyses do not draw any inferences about the impact of similarities of the notes to the accounts on the substitutive use of accrual-based and real earnings management.

In conclusion, the test results presented in table 8 are consistent with the second hypothesis on the relation between individual real earnings management proxies and similarities of the notes. That is, firms with more similar accounting policy and revenue recognition disclosures compared to other firms of the same industry and year conduct less real earnings management. Overall, the results for both variables of interest *SimilarityAccPol_lag* and *SimilarityRevRev_lag* are statistically significant in all specifications. The results in Panel B and C demonstrate that there remains a strong effect of both similarity scores on the dependent variable when using discretionary expenses or abnormal production costs to measure earnings management. Although there are lower levels of significance compared to first alternative, the results presented in Panels B and C do not change the inferences drawn in this research. Therefore, the use of discretionary expenses and abnormal production costs as the dependent variables demonstrates that both similarity scores are appropriate if only particular aspects of earnings quality are included in the regression model.

Overall, the test results suggest that higher within-industry similarity of the notes to the accounts can capture for earnings quality. Both similarity scores *SimilarityAccPol* and *SimilarityRevRec* are negatively associated with earnings management. According to the results presented in tables 7 and 8, this is true for both accrual-based and real earnings management activities. The significance of these results is confirmed by F-statistics presented at the bottom row of each table. Also, the statistical findings approve the use of detail-tagged XBRL notes of large accelerated firms for input-based comparability measures.

7 Summary and Conclusions

7.1 Overview

This PhD thesis has focused on the relationship between textual similarities of the notes to the accounts and earnings management. The motivation, objectives and the adopted approach of this research are reviewed in the following section 7.2. The main findings and inferences from the empirical analyses are summarized in section 7.3, followed by sections 7.4 and 7.5, which discuss the contributions of this research to theory and practice. Section 7.6 reveals the limitations of this research. Finally, section 7.7 concludes the PhD thesis by recommendations for future research.

7.2 Review of Motivation, Objectives and the adopted Approach of this Research

The phenomenon of earnings management is a major concern of accounting standard setters and regulators. There have been several accounting scandals in the United States, e.g. the Enron case and the WorldCom debacle (Jiraporn et al., 2008). The management of those firms manipulated the earnings and deceived the firm's stockholders. Earnings management activities negatively influence the firm's performance in the long-run and might even threat its existence. Thus, it is essential to detect earnings management activities. The identification and reduction of earnings management is a major subject in the principal agent relationship.

The accounting policy disclosures provide qualitative information to the firm`s stockholders (Li, 2010). This information is otherwise not presented on the face of the financial statements (FASB, 2012). In conclusion, the accounting policy disclosures are an important information source for external users to evaluate the firm`s current and future earnings (Tucker, 2015). According to the comparability research, firms in the same industry are subject to similar economic events and conduct their business in a similar environment (De Franco et al., 2011; Peterson et al., 2015). Especially firms that use industry-specific accounting policies are more comparable with industry peers according to Leary and Roberts (2014). This in turn should be translated into more similar accounting policy disclosures. Therefore, this PhD thesis is based on the idea that similarity scores of the notes are an additional aspect of disclosure quality. The increased

transparency through disclosure quality might restrict managers from influencing the earnings.

Despite the fact that there is a growing number of studies in the field of accounting comparability, the influence of textual similarities and differences in the notes received less attention by the literature. By following the comparability research, managers of comparable firms should translate the same economic events into similar notes and contain similar earnings and discretionary accruals. However, similarity scores of the notes were not expected to capture earnings quality (Peterson et al., 2015). Therefore, this study has analyzed the effect of textual similarities of accounting policy and revenue recognition disclosures on earnings management behaviour. In contrast to recent studies in related areas of research, this PhD thesis has focused on within-industry comparability.

While the previous literature specified which factors determine accounting comparability, there is a lack of theory about textual similarities in the notes. Therefore, this research aims to find out which factors cause similarities or differences in the accounting policy disclosures of firms within the same industry. This is of crucial importance to explore the properties and benefits of the similarity scores of the notes. Further, the empirical analysis provides evidence that the similarity of the notes is mainly related to factors that capture economic comparability between firms. This extends the comparability theory.

With regard to the measurement of textual similarities in the notes, there is another important development. This relates to the data format of available SEC filings on the EDGAR database in the US. The machine-readable XBRL technology allows analyzing financial reporting data in a more efficient way (Chychyla and Kogan, 2015). Big data can be analyzed in a standardized manner. Although, the availability of accounting data in XBRL format constantly improved over the previous years, the SEC EDGAR system in the US is already far advanced compared to other countries (Hoitash and Hoitash, 2018). Another important advantage is that the SEC EDGAR system specifies the particular industry of a firm according to a two-digit SIC code. This industry-specific SIC code allows to analyze the within-industry similarity of the notes in a standardized manner without manual searching processes. Therefore, this PhD thesis has not only provided evidence that similarities of the notes are an additional aspect of disclosure quality that can capture earnings quality. Rather, it demonstrates that XBRL is an ap-

propriate data source for measurement of textual similarity in the notes of firms within the same industry.

Moreover, this research aims to examine different parts of the notes to the accounts. The detail-tagged notes from SEC EDGAR database allow to analyze certain sections of the notes. Therefore, the empirical part of this study has adopted two different similarity scores. Firstly, the full set of accounting policy disclosures and secondly, the revenue recognition disclosures. The latter ones contain only information of a single accounting policy. The previous research did not focus on different parts of the accounting policy disclosures. This is despite the fact that the particular sections capture different aspects of earnings quality. Therefore, the distinct parts of the accounting policy disclosures have slightly different properties regarding disclosure quality and informativeness for the external users. This PhD thesis has extended the existing research by providing evidence about the utility of an aggregate similarity score of accounting choices compared to a single accounting policy similarity score.

In addition, this research has aimed to operationalize the textual similarity scores of the notes. For this reason the cosine similarity measure was adopted. It is a commonly used model in several areas of research, such as text mining and information retrieval. However, the cosine similarity measure was rarely employed in the area of accounting and finance. It offers several advantages for this study, e.g. the measurement of textual similarity without making difficult case-by-case decisions. Thus, the risk of mistakes through human-based data analysis can be minimized. However, there are also some shortcomings of the vector space model. A mayor limitation is that the cosine similarity measure increases with document length. This PhD thesis controls for these shortcomings and effects by adjusting the raw similarity scores. Therefore, it extends the empirical research by the adoption of an effective and appropriate method to operationalize the measurement of textual similarity.

This research aims to explore the relationship between similarities in the notes to the accounts and earnings management. The empirical analyses include both accrual-based and real earnings management. However, this research takes into account that the similarity scores of the full set of accounting policy and revenue recognition disclosures cannot capture all aspects of earnings quality. Therefore, the hypotheses tests are limited to certain earnings quality proxies that are expected to be affected by similarity of the notes. This PhD thesis adopts absolute discretionary accruals as the dependent vari-

able for the first hypothesis test. It is a popular proxy to measure accrual-based earnings management. Unsigned discretionary accruals are used since various accounting policy choices are offered under US GAAP to manage the accruals either upwards or downwards and accruals reverse over time.

In order to test the second hypothesis of this study, three different proxies are utilized to measure real earnings management. Thus, the second hypothesis test of this research includes three different dependent variables. First, an aggregated real earnings management measure is adopted as the dependent variable. The second version uses discretionary expenses such as R&D, SG&A, or advertising expenses. During a third and final alternative, real earnings management is measured by abnormal production costs. Each of the included proxies should represent a unique aspect of real earnings management.

The independent variables are the same in all models adopted by this research. These are the both variables of interest and included control variables. The variables of interest in both hypotheses tests are firstly, the similarity score of the full set of accounting policy disclosures and secondly, the revenue recognition disclosures. The set of control variables can be separated into three categories. The first group of control variables consists of several comparability indicators, the second one includes factors that are related to disclosure quality and finally, the third group tests the influence of important financial characteristics by a firm on the dependent variables. The control variables with 'Adj' suffixes are measured as the absolute difference of the variable for the firm and its industry-year median. This adjustment should ensure that abnormal results or variability compared to the industry-year median do not influence the inferences in this research. It is a common method to control for effects by firm-specific outliers which was also adopted by previous research (Ashbaugh-Skaife et al., 2008; Francis, 2004). Overall, the included control variables explain variations of the dependent variables that are used in the models of this research.

The literature review conducted by this PhD thesis discusses theories and empirical results from related areas of research. It points out arguments for drawing on these theories or using the findings of extant literature. These arguments are of crucial importance to develop the both research hypotheses (see chapter four). The statistical methods to validate and test the research hypotheses are outlined in the following section. In this context, the inferences drawn in the empirical part and the implications of this PhD thesis are summarized.

7.3 Findings and Conclusions

This section outlines the main findings of this study and reviews whether these findings are appropriate to answer the research questions. The four research questions are explained in chapter one of this PhD thesis. In summary, they have been structured to explore the potential association between similarities in the notes of firms within the same industry and earnings management behaviour. As shown in question three and four below this includes both accrual-based and real earnings management. By referencing back to section 1.3, the research questions are as following:

(1) Which factors determine similarity of the notes to the accounts between firms of the same industry?

(2) How can the similarity of textual notes to the accounts be measured in an effective way?

(3) How are similar financial notes to the accounts of firms in the same industry and year associated with accrual-based earnings management activities in the following year?

(4) How are similar financial notes to the accounts of firms in the same industry associated with real earnings management activities?

The main empirical analysis begins with a validation of the adopted similarity scores before testing the both hypotheses of this research. The remainder of this section summarizes the key findings of this validation test that demonstrates which factors are related to similarity of the notes to the accounts.

The validation test includes two dependent variables. These are the both similarity scores of the full set of accounting policy and revenue recognition disclosures. Further, the review of the extant literature showed that there are a few characteristics that should explain differences in within-industry similarity of the notes. These are included as independent variables in the validation test. As outlined in section 6.4, the empirical results demonstrate that there are no significant effects of the accounting comparability indicator by De Franco et al. (2011) on both of the two similarity scores of the notes. This indicates that textual similarities or differences in the notes cannot be explained by the output-based accounting comparability indicator.

Further, the validation test approves that sales volatility, cash flow volatility, longer cash-to-cash cycles and a firm's absolute price-sales multiples negatively influence the similarity of both the accounting policy and revenue recognition disclosures. This shows that dissimilarities in the notes are related to a more volatile and less stable environment compared to the industry-year median.

In addition, the test results in section 6.4 demonstrate that there is an impact of disclosure quality and disclosure complexity on the similarity of the notes. In conclusion, there is a positive association between firm size and both similarity scores of the notes. Bigger firms contain more similar accounting policy and revenue recognition disclosures. The same is true for firms that are subject to high-quality audits. The validation test shows that there are more similar notes to the accounts if an industry-specific specialist auditor is employed. In contrast, disclosure complexity reduces the degree of similarity. The results approve that abnormal length of accounting policy or revenue recognition disclosures are negatively related to both similarity scores used in this research.

Finally, the empirical findings of this PhD thesis show that there is an association between a firm's financial characteristics and similarities in the notes. In result, a higher return on assets and also, a higher leverage of a firm decrease the similarity of the notes compared to industry peers. Further, there are negative and statistically significant effects of capital intensity and growth of a firm's sales on both of the two similarity scores. Instead, there are statistically positive results for the book-to-market ratio according to the validation test. This means that lower growth firms contain more similar notes to the accounts. Overall, the empirical findings of the validation analysis demonstrate that similar notes are linked to factors that capture economic comparability. Further, the results show that the similarity scores are related to disclosure quality, disclosure complexity and partially related to factors explaining accounting comparability.

With regard to the second research question, this PhD thesis uses detail-tagged XBRL notes from SEC EDGAR system as data source. XBRL is machine-readable and allows to analyze massive accounting data in a standardized manner. For instance, time-consuming document searching processes are not required. Further, using detail-tagged XBRL notes allows to focus on specific parts of the notes. This PhD thesis does not only explore the similarity of the full set of accounting policy disclosures, but also the revenue recognition disclosures as a single accounting policy. The XBRL-formatted

notes are analyzed by employing a cosine similarity measure. It is straightforward to construct and compute. A big advantage of the adopted research approach is that manual data collection and difficult case-by-case decisions are not required. For instance, the particular industry of a firm is classified according to an industry-specific code (SIC) of SEC filings. This facilitates the examination of within-industry similarity. By using a Taylor expansion for note length and adopting the weighting function TF-IDF, this study controls for the major limitations of the method. In conclusion, the cosine similarity measure allows to operationalize the similarity scores of the accounting policy and revenue recognition disclosures.

The third research question constitutes the basis for the first hypothesis of this PhD thesis. This is firms with more similar notes of the previous year conduct less accrual-based earnings management activities in the following fiscal year. The main findings from the empirical analysis are summarized below.

The coefficients of both similarity scores of the full set of accounting policy and revenue recognition disclosures are negative and statistically significant in all specifications. The results even remain statistically significant when controlling for the output-based accounting comparability indicator or when including further control variables that might cause differences in the accruals. The overall results from the empirical analyses are consistent with the first hypothesis of this research. The empirical findings substantiate that both similarity scores are negatively related to abnormal levels of total accruals.

Finally, the fourth research question refers to the second hypothesis of this study. The empirical analysis includes three different proxies to measure real earnings management. Thus, the second hypothesis test includes three different dependent variables. First, an aggregated real earnings management measure is adopted as the dependent variable. The second version uses discretionary expenses such as R&D, SG&A, or advertising expenses and finally, real earnings management is measured by abnormal production costs.

There are negative and statistically significant coefficients for both of the similarity scores in all three alternatives and for all specifications. Overall, the empirical analyses show the strongest effects on the dependent variables when the aggregated real earnings management proxy is used. This was expected since firms might use various techniques of real earnings management. Thus, an aggregated measure increases the probability to

capture earnings quality. However, the overall results from the empirical analyses are consistent with the second hypothesis of this research. The empirical findings substantiate that both similarity scores are related to earnings quality as measured by real earnings management proxies.

In conclusion, the empirical analyses show stronger effects for the similarity score of the full set of accounting policy disclosures than for the revenue recognition disclosures. This was expected since US GAAP offers various ways to manage the earnings. Thus, there is a higher probability to capture earnings quality when using an aggregate similarity score instead of single accounting policy disclosures. Further, the coefficients for both similarity scores are more negative and significant if the output-based accounting comparability indicator by De Franco et al. (2011) is excluded. These results show that the adopted research approach is not appropriate to fully explain accounting comparability. The empirical analyses imply that the association between the both similarity scores and earnings quality cannot control for accounting comparability. In conclusion, more similar notes can restrict firms from managing their earnings. However, the similarity scores cannot appropriately determine if such firms have comparable accountings.

The overall results of this research substantiate that the used similarity scores of the notes capture an additional aspect of earnings quality. There are significantly negative effects on both accrual-based and real earnings management. The findings enhance the understanding of the importance of qualitative information provided by the full set of accounting policy disclosures, but also specific sections of the notes. Also, the statistical findings approve the use of detail-tagged XBRL notes of large accelerated firms for input-based comparability measures. Therefore, it is concluded that this part of the SEC's 10-K filings provides reliable data for conducting textual similarity research.

7.4 Contributions to Theory

The vast majority of previous research in the field of accounting comparability is limited on quantitative financial information. The analysis is objective and straightforward to construct since it is based on figures of the financial statements. This PhD thesis contributes to the theory by exploring the merits of qualitative information provided by accounting policy and revenue recognition disclosures. To the best of the researcher's knowledge, this is the first research examining the relationship between similarities of the notes to the accounts and earnings management. The results improve the under-

standing about earning management by demonstrating that more similar notes capture an additional aspect of earnings quality.

Further, most extant studies focus on accounting comparability across industries and in the time-series. In contrast, the impacts of similarities or differences in the accounting of firms within the same industry have not previously been analyzed. This research explores the within-industry similarity of the accounting policy and revenue recognition disclosures. It contributes to theory that the notes of firms in the same industry are more similar than across industries.

Prior to this PhD thesis, it was unstudied which factors determine similarities of accounting policy and revenue recognition disclosures. By exploring the extent to which different factors cause variations in the textual similarity of the notes, this research achieves two important targets. First, it contributes to the theory by explaining which factors cause similarities or differences within the notes to the accounts. Second, it validates the utility of both adopted similarity scores within the scope of this study, but also for any future work in this area.

The findings of this study demonstrate that complexity in accounting policy and revenue recognition disclosures impairs the users' understanding of the reported earnings of a firm. This increases the opportunity to implement earnings management without scrutiny. The results show that abnormal disclosure length is related to higher magnitudes of both accrual-based and real earnings management. Accordingly, this PhD thesis contributes to the manipulation theory that managers opportunistically manage earnings when the notes are more complex and thus, less similar. Such contribution has not yet been achieved to the best of the researcher's knowledge.

Previous research in the field of accounting comparability mostly used an output-based measure as introduced by De Franco et al. (2011). Such studies complain that input-based measures are related to difficult design choices. Despite this fact, this research considers accounting inputs, such as accounting policies as an additional proxy for accounting comparability. There are two important factors that avoid difficult design choices within this PhD thesis. First, the use of machine-readable XBRL notes as data source and second, the adoption of cosine similarity measure that operationalizes the similarity scores. A big advantage is that the input-based similarity scores do not rely on earnings itself. Therefore, the findings of this research contribute to theory by providing exogenous evidence for the earnings quality.

Moreover, the empirical results validate the use of cosine similarity measure for textual analysis research. The shortcoming of increasing cosine measure caused through document length is eliminated by a Taylor expansion for note length. Considering this adjustment, the contribution made to theory is that cosine similarity measure is an appropriate method for textual analysis.

With regard to the agency theory, many previous studies explained that information asymmetries in the accounting constitute the basis for earnings management. Prior research about disclosure quality suggests that accounting policy disclosures make users of financial statements better informed. Transparency in the notes to the accounts reduces information asymmetries. The theoretic and empirical findings of this PhD thesis demonstrate that the transparency in the financial reporting increases if the notes are more similar with industry peers. For the first time, similarity scores of the notes are considered as an additional aspect of disclosure quality.

The empirical results of this research show that more similar notes to the accounts restrict firms from both accrual-based and real earnings management. Following this, the measurement of textual similarities of the notes provides an effective monitoring mechanism regarding earnings quality. Accordingly, this PhD thesis contributes to theory by enhancing the understanding of the importance of qualitative information for good corporate governance. The findings validate the adopted similarity measure and confirm a new way of determining earnings quality that complements corporate governance mechanisms.

The empirical results of this research make a contribution to the theory in two ways. First, it demonstrates that similarity of the accounting policy and revenue recognition disclosures is negatively associated with earnings management activities. Hence, the empirical results provide justification to include the similarity of the notes in measurement of earnings quality. Second, this study approves that XBRL is an appropriate data source for comparability research. In addition, the findings show that detailed-tagging of XBRL data extends the opportunities for conducting research by focusing on different sections of the financial reporting, e.g. specific parts of the notes. To the best of the researcher's knowledge, this study is the first that analyzes specific parts of the notes to the accounts.

7.5 Contributions to Practice

The empirical results of this PhD thesis demonstrate that similarity of the accounting policy and revenue recognition disclosures is negatively associated with earnings management activities. Therefore, users of financial statements could benefit from these findings by turning their attention to textual similarities of the notes. Specifically, firms using accounting policies against the industry practice have not only greater flexibility to manage earnings, but also dissimilar notes compared to industry peers. The results show that more similar notes indicate higher earnings quality as measured by accrual-based and real earnings management. Consequently, this research contributes to practice by enhancing the understanding about earnings quality for external users.

In addition, the theoretic and empirical findings of this PhD thesis show that more similar notes increase the transparency in accounting. This in turn limits the opportunities to implement earnings management without scrutiny. Therefore, higher magnitudes of disclosure quality as measured by more similar notes play a key role to constrain managers' propensity to manipulate earnings. Based on this, contribution made to practice is that accounting standard setters and regulators must maintain and improve disclosure quality.

With regard to the corporate governance mechanisms, e.g. monitoring activity by the external auditor or oversight work by the audit committee this research introduces and validates a new way of detecting earnings management activities. This has the capability to improve the effectiveness of monitoring regarding earnings quality.

Further, the findings of this PhD thesis contribute to practice by demonstrating the utility of detail-tagged XBRL accounting data. In comparison to other data formats, there are lower information processing costs since detail tagging improves the accessibility and comparability of information. The results provide confirmation regarding the work of XBRL regulators and support the ongoing debate about an expansion of the XBRL standard in additional parts of the financial reporting.

7.6 Limitations of the Research

This PhD thesis is subject to a number of limitations that are outlined in the following. Accordingly, the results of this study must be interpreted cautiously by considering these shortcomings.

- The empirical analyses use detail-tagged notes from the SEC EDGAR system as data source. The sample of this research includes only SEC filers with a certain status, namely the large accelerated firms. Hence, inferences drawn in this study should be interpreted carefully with regard to smaller firms. Also, it must be taken into account that the SEC EDGAR system in the US is already far advanced compared to other countries. Consequently, the adopted research approach might not be appropriate to explore qualitative accounting information in each country.

- This PhD thesis focuses on within-industry similarity of the notes. The analysis is limited to a certain number of industries (see section 5.4). The research data of included industries led to significant empirical results. However, generalization of the findings might not be appropriate. The research results must be interpreted with the awareness that the underlying data is limited to large accelerated SEC filers that belong to certain industries.

- The similarity of the accounting policy and revenue recognition disclosures should only be affected by certain aspects of earnings quality. Therefore, the hypotheses tests use only certain proxies to measure earnings management. As a consequence, the inferences drawn in this study should be interpreted cautiously with regard to other measurements of earnings quality.

- A steadily disappearing limitation is related to the use of XBRL technology. The detail-tagged notes from SEC filings are fairly new and XBRL conversion is still in progress. Therefore, the time-series availability of data is limited. However, this will constantly improve over the years.

- The empirical analyses show strong effects of both similarity scores on earnings quality as measured by accrual-based and real earnings management proxies. An inevitable limitation is caused by the lack of clear-cut causation. Both the content of the notes and decision about earnings management activities are most likely jointly determined by the management. This endogenous relationship may cause unreliable or even biased results. To avoid this shortcoming, both similarity scores are lagged by one year in all models used within this research. By following many previous empirical studies, lagging of the independent variable is an appropriate method to control for endogeneity (Nikolaev and Van Lent, 2005). Further, the endogeneity

concerns are mitigated by the fact that not only the management can influence the content of the accounting policy and revenue recognition disclosures. As shown in the validation analysis, there are additional factors such as audit quality and firm size that cause textual variations within the notes.

- Another endogeneity concern is associated with the accounting comparability indicator by De Franco et al. (2011). It is included in the third specification of the hypotheses tests. However, this output-based indicator is based on the earnings themselves. To avoid research results that are caused through this endogenous relationship, the accounting comparability indicator was also lagged by one year. As explained above, this is an appropriate method to control for endogeneity. Therefore, endogeneity issues should not influence the overall results of this PhD thesis.

- An inherent limitation associated with the adopted research approach is that the cosine similarity measure increases with document length. Consequently, longer accounting policy and revenue recognition disclosures cause automatically higher similarity scores. By following the previous empirical research, this PhD thesis adopts Taylor expansion for note length to control for this effect. This adjustment should avoid that the results are influenced by variations in the document length.

7.7 Recommendations for Future Research

With regard to the adopted research approach, there are several opportunities for future research to extant the contemporary literature. Since more detail-tagged notes are getting available, further sections of the notes could be explored. A study about the similarity of the tax notes would not only provide insights about a firm`s tax aggressiveness and tax planning strategy, but also about possible tax avoidance issues. Textual analysis of disclosures regarding uncertain tax benefits, valuations allowances, foreign earnings designated as permanently reinvested and book-tax differences could demonstrate whether a higher degree of similarity is related to tax compliance.

The findings of this research demonstrate the supportive effect of XBRL adoption in the field of accounting and finance. It improves information processing for data users and the detail-tagged XBRL filings from SEC EDGAR even allow to explore specific parts of the financial reporting. However, the properties and benefits of a XBRL conversion for other accounting information is still understudied. For example, future research

could conduct a study about the impacts of a XBRL adoption to the narrative textual descriptions in the SEC's 10-K reports, e.g. auditor`s opinion or MD&A. This would demonstrate to which extent XBRL or even detail-tagged XBRL data can improve the accessibility and comparability of information from these parts of the financial reporting. Especially with regard to the XBRL regulators, such a study could show the need of an extension of detail-tagged XBRL data to other sections of financial reporting.

Moreover, future research may construct further input-based accounting comparability measures by studying the effects of auditor changes and audit quality on the similarity of different parts of the notes. The findings of this research imply that high-quality auditors play a key role in a firm's disclosure policy. Also, they can ensure application of industry-specific accounting policies which in turn leads to more similar accounting policy disclosures. Conducting a study about auditor changes and employment of industry-specific specialist auditors could explain abnormal changes in the similarity of the notes. Further, research about audit quality and the similarity of other parts of the notes, e.g. the MD&A section is needed. This would explain to which extent auditing might influence different sections of the notes. As more detail-tagged XBRL filings are getting available, future studies have the opportunity to explore the relationship between auditing and different parts of the notes both cross-sectionally and in the time-series.

Due to the fact that accounting regulators in several countries have begun to mandatory convert to detail-tagged XBRL filings, it is possible to study the merits of an input-based accounting comparability measure in different countries, e.g. the United Kingdom. Conducting a similar research by using accounting data from another country instead of SEC filings from the US would enrich the literature in three ways. First, investigating the effect of more similar accounting policy disclosures on earnings management behaviour in a different country could validate the adopted research approach. Second, it would explain to which extent similarities in the accounting policy disclosures can restrict managers from manipulating the earnings in other countries than the US. Finally, it would provide additional empirical evidence to confirm that the inferences drawn from the results of this research are not only based on the used data sample.

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Case Law

Case Law of the United States of America

- TSC Industries, Inc. v. Northway, Inc., 426 U.S. 438 (1976).

- Arthur Andersen LLP v. United States, 544 U.S. 696 (2005).

APPENDICES

Appendix 1: US Accounting Regulations

This PhD thesis includes several US accounting regulations in order to get a comprehensive set of relevant vocabulary used within the notes to the accounts. Words which are not listed in this 'accounting dictionary' should add no content that is relevant for the textual analysis. There is a risk that similarity measures increase with longer disclosures caused through a higher number of irrelevant words. Consequently, these words were removed to conduct a robustness check regarding the validity of the adopted research approach. The accounting regulations included in the 'accounting dictionary' are listed in the following:

- Accounting Research Bulletins published by the Committee on Accounting Procedure.

- AICPA Practice Bulletins.

- EITF-Accounting recommendations issued by the Emerging Issues Task Force (EITF). The EITF is an assisting body of FASB.

- FASB Standards Interpretations.

- FASB Technical Bulletins.

- Financial reporting concepts and statements issued by the FASB.

- Financial reporting opinions by the Accounting Principles Board (APB).

Appendix 2: Stop-Word List

By drawing on the study of Brown and Tucker (2011), this research includes a stop-word list as introduced by Li (2010). This list is presented in the following:

a	but	how's	own	to
about	by	if	same	too
above	could	in	should	under
after	did	into	so	until
again	do	is	some	up
against	does	it	such	very
all	doing	it's	than	was
an	down	its	that	were
and	during	itself	that's	what
any	each	more	the	what's
are	few	most	their	when
as	for	nor	theirs	when's
at	from	of	them	where
be	further	on	themselves	where's
because	had	once	then	which
been	has	only	there	while
before	have	or	there's	why
being	having	other	these	why's
below	here	ought	this	will
between	here's	out	those	with
both	how	over	through	would

Appendix 3: Variable Descriptions

The following table shows the description and calculation of variables used in this paper. Annual Capital IQ data items are presented in parentheses in the calculation column. Winsorized means the variable was winsorized at the top and bottom 1 percent to control for outliers.

Variable Name	Description	Calculation
Abdisx	Abnormal discretionary expenses.	Discretionary expenses divided by lagged total assets minus the fitted value using Model (3) to measure normal level of discretionary expenses. Discretionary expenses are defined as the sum of advertising expenses (IQ_ADVERTISING), R&D expenses (IQ_RD_EXP), and SG&A expenses (IQ_SGA_SUPPL). Advertising expenses were set to zero if missing. *Abdisx* is multiplied by minus one so that higher values of *Abdisx* represent higher levels of income-increasing earnings management. *Winsorized*.
Abprod	Abnormal production costs.	Abnormal levels of production costs divided by lagged total assets minus the fitted value using Model (2) to measure normal levels of production costs. Production costs are defined as the sum of cost of goods sold (IQ_COGS) and changes in inventories from the preceding year (IQ_INVENTORY). *Winsorized*.
AbsDAC	Unsigned discretionary accruals.	The absolute value of cross-sectional discretionary accruals as proposed by Cohen et al. (2008, p. 764). *Winsorized*.
BigFour	A proxy for audit quality.	Big Four auditor dummy. Set to 1 if a firm is audited by a "Big Four" auditor.
BTM	Book-to-market ratio.	(IQ_TOTAL_EQUITY)/ (IQ_MARKETCAP). *Winsorized*.
CapInt	Capital intensity.	Net property plant and equipment to total assets. (IQ_NPPE)/(IQ_TOTAL_ASSETS). *Winsorized*.
CCC	Cash-to-cash cycle.	Days sales outstanding (365/[IQ_TOTAL_REV /average IQ_AR]) plus days inventory outstanding (365/[IQ_COGS /average IQ_INVENTORY]) minus days payable outstanding (365/[IQ_AP / IQ_COGS]). *Winsorized*.

Ind_acctcomp	Accounting comparability measure.	The mean aggregated comparability measure adopted from De Franco et al. (2011, p. 899), see text on pp. 141-142 for more details. Obtained from http://www.mit.edu/~rverdi/. *Winsorized*.
LengthAccPol	Length of accounting policy disclosures.	The natural logarithm of the number of words of accounting policy disclosures from XBRL-tagged 10-K notes to the accounts.
LengthRevRec	Length of revenue recognition disclosures.	The natural logarithm of the number of words of revenue recognition disclosures from XBRL-tagged 10-K notes to the accounts.
Leverage	Leverage.	Total debt divided by total assets (IQ_TOTAL_DEBT)/ (IQ_TOTAL_ASSETS). *Winsorized*.
Multiple	Price multiples.	The calculation of the market value of a firm is are based on price multiples. In particular, *Multiple* is calculated as the natural log of a firm's market cap to sales revenue of the current fiscal year.
OpCycle	Operating cycle.	The sum of days sales outstanding and days inventory outstanding. See calculation for *CCC*. *Winsorized*.
REM	Real earnings management.	Aggregate real earnings management measure, which is calculated as the sum of *Abprod* and *Abdisx*. *Abdisx* is multiplied by -1 so that higher values of *Abdisx* represent higher levels of earnings management. *Winsorized*.
RoA	Return on assets.	Income before extraordinary items (IQ_NI_AVAIL_EXCL) divided by lagged total assets. *Winsorized*.
SalesGrowth	Sales growth.	Changes in Sales from the previous year divided by lagged Sales (IQ_TOTAL_REV). *Winsorized*.
Similarity-AccPol	Similarity score of the notes to the accounts of textual accounting policy disclosures.	Aggregated similarity score, which is calculated as the mean cosine similarity measure adopted from Brown and Tucker (2011, p. 315) of a firm's XBRL-tagged accounting policy disclosures relative to all other firms in the same industry and year. *Winsorized*.
Similarity-RevRec	Similarity score of the notes to the accounts of textual	Aggregated similarity score, which is calculated as the mean cosine similarity measure adopted from Brown and Tucker

	revenue recognition disclosures.	(2011, p. 315) of a firm's XBRL-tagged revenue recognition disclosures relative to all other firms in the same industry and year. *Winsorized*.
Size	Firm size.	Natural log of market value of equity. Ln(IQ_MARKETCAP).
Specialist-Auditor	A proxy for audit quality.	Specialist auditor dummy. Set to 1 if a firm is audited by the auditor with the most conducted audits within a SIC code and year.
StdOpCF	Cash flow volatility.	The standard deviation of scaled cash flow from operations (IQ_CASH_OPER / IQ_TOTAL_ASSETS) for the prior five years. *Winsorized*.
StdSales	Sales volatility.	The standard deviation of scaled sales (IQ_TOTAL_REV/ IQ_TOTAL_ASSETS) for the prior five years. *Winsorized*.
TAS	Total assets.	(IQ_TOTAL_ASSETS)
|UnusualLength-AccPol|	Proxy for information uncertainty in the accounting policy disclosures.	The absolute difference of the natural log of number of words in accounting policy disclosures to the industry-year median.
|UnusualLength-RevRec|	Proxy for information uncertainty in the revenue recognition disclosures.	The absolute difference of the natural log of number of words in revenue recognition disclosures to the industry-year median.
WordsAccPol	Length of accounting policy disclosures.	Number of words of accounting policy disclosures from XBRL-tagged 10-K notes to the accounts.
WordsRevRec	Length of revenue recognition disclosures.	Number of words of revenue reccognition disclosures from XBRL-tagged 10-K notes to the accounts.
Zscore	Altman's Z-Score.	(IQ_Z_SCORE). *Winsorized*.